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A FAMILY-TEXT BOOK FOR THE COUNTRY ;

OR

THE FARMER AT HOME :

BEING

A CYCLOPAEDIA

OF

THE MORE IMPORTANT TOPICS

IN

MODERN AGRICULTURE,

AND IN

NATURAL HISTORY AND DOMESTIC ECONOMY,

ADAPTED

TO RURAL LIFE.

BY REV. JOHN L. BLAKE, D. D.

AUTHOR OF FARMER'S EVERY DAY BOOK ; AGRICULTURE FOR SCHOOLS ; THE FARM AND THE
FIRESIDE ; FAMILY ENCYCLOPAEDIA, AND GENERAL BIOGRAPHICAL DICTIONARY.



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PREFACE.

It is the design of the author, in all his labors for rural localities, to improve the mind as well as the soil. Indeed, such labors for the former will ultimately prove of more benefit than those having exclusive reference to the latter. If the one is duly promoted, the other will follow in its wake. Whenever a rural population becomes imbued with a well cultivated literary taste and a love of science, there need be no apprehension that agriculture will be neglected, or that it will fail to be duly appreciated. Rarely will the soil receive a defective culture, except from the ignorant and the illiterate.

It has sometimes been thought by farmers that a book, having particular reference to their vocation, is necessarily filled with oxides and silicates, or with sulphates and phosphates; that the mental food of the scientific agriculturist is a compound of caustics and volatilized poisons; and that his very breath and clothes are so impregnated with carbonates and alkalis, that they cannot approach him without experiencing a kind of suffocation. Misapprehensions of this sort must be removed. Prejudices of this nature must be overcome. If not, the treasures of chemical knowledge will do little in renovating the soil. On the contrary, sterility will increase, till the wand of desolation passes over the broad earth. We labor to overcome these obstacles—to progress in rural economy.

To this end we connect, in a book for a rural population, with the topics more immediately interesting to the husbandman, brief sketches of political economy. What is better calculated to awaken attention in the producers of wealth, than to be taught the channels in which it is made to flow? And, we connect with them brief sketches of natural history and domestic economy. Is there nothing in these to cast a charm upon his hitherto dreary pathway? Is there nothing in these to impart bright and cheering gleams amidst the dark shadows of his monotonous and wearied life? The records of animal and vegetable physiology are the gems of our best literature. There is a richness in them found nowhere else. Compared with them other records are insipid. The same laws which regulate the growth of farm animals, regulate the growth of all animals spread over the wide creation, whether of tiny or gigantic dimensions. The same laws which regulate the vegetable tissues of the farmer's garden and grass fields, regulate the lofty trees, the magnificent foliage, and the rich fruits of the tropics. All these are kindred subjects. Is it no rational source of

inquiry at the festive table and the social circle of the farmer, to know whence came our tea and our coffee, our sugar and our spices, and indeed the hundred other articles, foreign as well as domestic, that enter into human food ; or, of the hundred different vegetable tissues, from all climes, that enter into the constituency of human apparel ; or, of the hundreds of mineral and vegetable substances that enter into the various arts of life ? If subjects like these do not awaken the dormant energies of the mind, it is difficult to tell what will do it.

A better book than this, on the same plan, might possibly be made. Possibly we might have made a better one. If so, it would doubtless be difficult to satisfy the public that our reason is good for not doing it. We are not quite satisfied with that reason ourself. However, we have some grounds of justification. Even doing what we have done was a mental and physical toil exceeding the prudence every one should exercise in regard to the preservation of his own life and health. Our voyage on the ocean of life has already been somewhat long. Our bark has been deeply laden, and sometimes feebly manned. And, above all, we have sometimes had stormy weather. Hence to keep the ship in order, the hull well trimmed, the deck well swept, and the sails well set, has left but little time to make fanciful observation and embellishment. Such a mariner has but little leisure for his log book, or to look at the stars—to watch their transits, their declinations, or their ascensions. To leave our tropes : it is sufficient to say, that during the present winter, in addition to a general out-door supervision on the farm, and to writing for a dozen periodicals, the present volume is the firstborn of a twin progeny, for which we must assume the paternity. The only mitigation in the responsibility lies in the fact that more than one half of this one was prepared several years ago, and has not, perhaps, received the thorough revision, which a longer experience could have given it.

Men of enterprise and energy are under the guidance of destiny or Providence. They are carried forward whither they had not dreamed. They make their own pathway, without landmarks, before them. Others follow in their track, and those possessed of sufficient genius sometimes embellish the fabric devised for them. They are welcome to do it, so far as our hasty productions can be made available to public utility. None have but a temporary proprietorship in the avails of the mind or of the soil. Both, at short intervals, are to be merged again and again, successively, to the end of time, in the common joint stock for all the successive members of the human family. It is the duty of each one to add to this stock all in his power ; and, on the other hand, not to waste any of it, and to use as little of it as practicable for his own individual convenience.

J. L. B.

NEW YORK, *March 20th 1852*

INTRODUCTION.

Home is the resort
Of love, of joy, of peace and plenty, where,
Supporting and supported, polish'd friends
And dear relations mingle into bliss.

Why is home the most desirable place that can be found to the man of correct taste? Why does he enjoy himself better there than elsewhere? Why do his affections centre in it, as the atoms in a crude mass of matter tend to their common point of magnetic attraction? It is because every thing appertaining to it is in harmony with his own nature; and he is so familiarized with the whole that he is as much a part and parcel thereof as a leg, or an arm, or a hand, or a foot is a part of the human structure! When in that hallowed precinct the same system of instinct and pulsation is common to him and every one sharing it with him; there is, as it were, but one current of blood to give vigor to the whole frame; but one measure of animal heat to warm every part; and but one mental aspiration to impart that general buoyancy and elasticity which characterize the entire organization with moral beauty. Remove him from this communion of interest and mental and physical action, and in a measure he becomes paralyzed like an amputated limb, or like an individual translated from the knowledge and influence of social institutions to some uninhabited and desolate part of the earth. Home is dear to him because he is familiar with everything pertaining to it; because in it with all dear to him he has a joint interest; and, because there is about it a fragrance which perfumes the atmosphere breathed by all, and above it a halo that dispels every dark and cold shadow which gathers upon the soul.

The American Farmer at Home; or a Family Text-Book for the Country.

We have chosen this title to the volume here offered to the public, from a belief that it will readily convey the idea most prominent in the mind of the author when engaged in its preparation. In saying that a man is at home, it will be understood that he is in his own house, or on his own premises; that he is attending to his own duties, and is of course familiar with their nature and importance. And the expression has a constructive or figurative as well as a literal meaning. In this sense we use it. Nothing is more natural than to suppose a man at home or in his own house is familiar with its architecture; with the materials of which it is composed; with its several apartments and their respective uses; with its conveniences and defects; and especially with its inmates, with its furniture, and with all its other contents. If he were not familiar with all this he would be an anomaly of manhood. Thus, also, we suppose that an individual living in a city is familiar with its streets and lanes; with its public and private buildings; with its inhabitants and social economy; and with its amusements and all its diversified business elements. And so we presume that an individual living in the country is particularly familiar with rural scenery and rural labor; with rural society and rural recreations; and not less with all the constituents of domestic economy and rural enterprise and labor usual in such localities. These are natural inferences. They are the spontaneous results of all conventional habits of thought and uses of language. Consequently, every man is judged to be well acquainted with all the constituents of his own business transactions, and with the varied ramifications of the labor bestowed upon them, whether mental or physical.

Hence, of the individual familiar with these things, we say, that in reference to his country, or to his more particular local residence, or to his occupation, he is at home; and that if he is not familiar with them, he is not at home—that his appropriate sphere is somewhere else. For instance, if one go to an apothecary's shop with a prescription for certain compounded medicines, and the clerk cannot find the materials of which they are to be composed, or is incompetent, if found, to prepare them, or is unable to read the prescription in consequence of his ignorance of the scientific terms used in it, we say he is not at home. So likewise, if one were to go to a mechanic's shop for a piece of workmanship in his own line of labor, and he were ignorant of the materials to be used in its

construction, or of the process of putting them together, we say at once, that he appears not to be at home. The same would be our apprehensions in every similar case that can be imagined ; and all would readily understand such an use of language. There is no propriety in saying a merchant, or a mechanic, or a druggist, or a shopkeeper, is at home in his business, unless he is familiar with all its details ; and the being familiar with it is the foundation for success in it, and attachment to it.

It may, therefore, emphatically, though figuratively, be said of the farmer, that in order to be at home in his vocation he must be conversant with whatever contributes to his success. He must understand the nature of soils and the means of improving them. He must understand the elementary constituents of the vegetable creation in every variety, and the means of providing them. He must understand the separate and combined influence of light, of heat, of air, and of water in vegetable development. He must understand the best modes of culture, including all the implements used therein ; and especially the adaptation of particular soils and local metereological influences to the production of particular crops. And he must on no account be ignorant of animal physiology, and of the particular kinds and breeds of stock, generally most productive of profit, or suited to his own individual circumstances. If in these things the farmer is well skilled, he is at home in his vocation, and he will be likely to render that vocation reputable and productive of a fair remuneration for his labor and other capital required in it.

The present volume is designed to assist the farmer in being at home in his vocation. The materials composing it are so arranged that he can in the most ready and convenient manner turn to any subject on which he needs information. No time will be lost in ranging through a whole chapter in pursuit of a fact described in a few lines. He will speedily acquire the habit of opening to it with the facility of finding the definition of any word in a common dictionary. This book, therefore, is not so much intended for protracted study and elaborate investigation or for amusement, as for occasional reference, and to make the farmer's fireside, in short intervals of leisure, radiant with intelligence and enlivened conversation, on topics relating to rural life and domestic economy. As such it is compressed into a small compass. A large volume would not be suited to the purpose contemplated. Such an one would bewilder

rather than speedily enlighten, the mind having only a short season of leisure at command.

In addition to the definitions and illustrations of subjects and terms particularly connected with and having reference to agriculture, there are also a few others having reference to the more common occasions for a knowledge of general literature and science. These, in a volume for every-day use, will render the subjects to which they relate far more familiar than though found only in large works. Such is the present state of education, that every individual is presumed to have some general acquaintance with the popular elements of classical learning, and without it one is deemed lacking in ordinary intelligence. Limited as are the means here introduced to meet such an exigency, it is imagined that they will be found of material value for the department of society, now particularly in view, and not of detriment to any other interest, whether social or monetary.

In every family there should be a code of household literature, embracing such topics as are constantly presenting themselves in the diversified developments of domestic economy, as well as in the sterner business operations of life. To have no acquaintance with the history and physiology of articles used for human apparel, or ornament, or health, or dietetics; or, with the arts and processes required in their production, denotes a deficiency of mental culture inconsistent with the age in which we live. And, in the country where facilities for acquiring such knowledge are less abundant than in cities, it is especially needful, that there should be within the reach of all, not supplied with more elaborate productions, a literary compend like the one now offered to the public. A familiarity with such subjects readily presents in the family circle, both at the fireside and about the festive board, the elements of intellectual and enlivened conversation. Home is thus made cheerful; and, all mutually assist in rendering it a school of improvement, as well as a centre of social attraction. Hence, without other aids to literary progress, they will severally become respectable for intelligence, and rarely will one of the number go abroad in search of pleasure or means of contentment.



THE FARMER AT HOME.

ABDOMEN. That portion of the body of an animal which contains the stomach, intestines, heart, liver, kidneys, and spleen, with their several appendages called the belly.

ABORTION. The premature separation of the offspring from the mother. It is also called miscarriage, and in farm animals, slinking, slipping, and casting. Abortion in cows is of a frequent occurrence. A farmer at Charentin, out of a dairy of twenty-eight cows, had sixteen slip calves at different periods of gestation. To prevent, as far as possible, this annoying evil, let them be well fed, and kept from rough treatment of every kind. They should be exempt in seasons of pregnancy from sudden exposure to heat or cold; and if in stalls, the ventilation should be free, that there be no deficiency of fresh air. In mares also it is of no rare occurrence. It frequently arises from over-exertion, which should be carefully avoided. When used for labor they should be treated kindly; and should not be allowed to go in pastures where they are liable to leap fences, logs, or ditches.

ABORTIVE. This is a term frequently used in Botany to denote the absence of stamens or pistils whereby fruit cannot be produced. It also denotes the deficiency of any other organ. And, it is applied by gardeners and farmers to flowers, seeds, and fruits, which do not come to maturity, in consequence of external injury from the weather, from insects, or other causes affecting their growth. Thus fruit often becomes abortive, in consequence of cold winds or frosts in spring checking the flow of the nutritive juices; and after losing its healthy color it shrivels and falls. The same effects arise too from the depredation of caterpillars on the leaves and branches.

ABSCESS. This usually signifies an animal swelling or tumor, containing pus or putrid matter, which takes place in consequence of previous inflammation.

ABSORPTION. The conversion of gaseous fluids into liquids and solids. Fluids and gases only can be absorbed. As plants are

not furnished with any individual organ similar to the mouth of animals, nature has furnished them with pores through which nourishment is received. These pores exist in the leaves and the external surface of the bark; and, the process of their agency in absorbing this nourishment is not unlike that of the passage of water into the pores of sponge, or the rising of water through the valve of a pump.

ABUTMENT, the head or end; that which unites one end of a thing to another. But usually it denotes the solid pier or mound of earth, stone, or timber, which is erected at the bank of a river to support the end of the bridge and connect it with the land.

ACACIA. A beautiful shrub, a species of which bears rose-colored flowers. A thorny shrub of this name is common in the deserts of Asia and Africa, and produces gum Arabic. The Chinese employ the flowers of a plant called by this name to produce that beautiful and durable yellow which has been so much admired in their different stuffs.

ACANTHUS, the name of an herb remarkable for the model of the foliage. In the capitals of the Corinthian and Composite orders of architecture there is an ornament resembling the leaves of the acanthus.

ACCIPITRES, the order of rapacious birds containing the vulture, the owl, the hawk, the eagle, and other birds of prey. The name is derived from two Latin words which mean to seize the object of which they are in pursuit.

ACCLIMATE or **ACCLIMATION**. In rural economy this term signifies the adaptation of animals or vegetables of one clime or temperature to a different one. For instance the culture of tropical plants in a temperate zone; or even the removal of one from the hot house to the open air.

ACETATE, a salt formed by the combination of any base with acetic acid, for instance, vinegar with earths or metals. Some plants naturally contain acetic acid. It is found in the chick pea; in the elder berry; and, in the date palm tree.

ACIDS, a class of chemical substances, which are so called from their taste, or the sensation of sourness they produce on the tongue. They change vegetable blue colors to red. When they combine with alkalies, or the metallic oxides and earths they form the compound salts. Mineral acids are those which are produced from a compound or union of oxygen gas with mineral substances, as sulphur.

ACONITE, Wolfsbane, or Monkshood. A plant, the flower of which resembles the hood of a monk. There are several species of the aconite, most of which are violent poisons. The ancients were so surprised at their pernicious effects, that they were afraid to touch the plants; and hence sprung many superstitious precautions about the manner of gathering them. Theophrastus relates that there was a mode of preparing the aconite in his days, so that it should only

destroy life at the end of one or two years. It is confidently affirmed, that the huntsmen on the Alps, who hunt the wolves, and other wild animals, dip their arrows in the juice of these plants, which renders the wounds occasioned by them mortal. A decoction of the roots has been used to kill bugs; and the powder disguised in bread, or some other palatable vehicle, has been employed to destroy rats and mice. Mathiolus relates that it was given by way of experiment to four condemned criminals, two at Rome in 1524, and two at Prague in 1561. Two of them died and the other two with great difficulty were recovered.

ACORN. The seed or fruit of the oak; it was reckoned, in former times, an important article of human sustenance. We are told by historians, that the natives in the forests of Germany and Britain, fed on this fruit as a luxury; and that violent quarrels sometimes arose between the chiefs of their clans, respecting the division of their crops of acorns. According to Volney, the peasants of Syria, at this day, depend for a considerable part of their food on oak-acorns, which they gather upon Mount Lebanon; for if they raise barley and wheat, the Arabs of the wilderness come in harvest time, and rob them of their crops.

ACRE, a quantity of land containing one hundred and sixty square rods or perches; four thousand eight hundred and forty square yards; and forty-three thousand, five hundred and sixty square feet. This is the English statute acre. In measuring an acre by yards, the usual practice is to trace off seventy yards in length and seventy in width; this in a rough way may be considered near enough for most practical purposes in laying out a farm; but as seventy yards each way make four thousand nine hundred square yards, they exceed one acre by fifty square yards. To determine an accurate acre, it should be measured seventy yards in length by sixty-nine and one-seventh yards in breadth. This will be an acre wanting a few inches. Still greater accuracy will be attained by measuring off two hundred and nine feet one way and two hundred and eight feet, five and one-eighth inches the other. This will be precisely a square acre, or exceeding it only two-sevenths of a square foot. The acre of Scotland contains six thousand, one hundred and fifty-one and two-fifths square yards. The French arpent or acre is nearly equal to the Scottish acre. The Irish acre is seven thousand, eight hundred and forty square yards.

AFFINITY is an elective attraction, or a tendency that different species of matter have to unite, and combine with certain other bodies, and the power that disposes to continue in combination.

AGRICULTURE. The art of cultivating the earth, so as to increase the quantity and improve the quality of its vegetable production. This may be considered the most ancient, and is certainly the most important, of all arts. It forms the basis of society, and

constitutes the grand distinction between savage and civilized life. In the necessity of cultivating the earth for subsistence, social order commenced. The wandering life of a nation of hunters admits of little or no improvement. Agriculture has the merit of having reclaimed mankind from this hopeless state ; by drawing them together in communities, and imposing on them the necessity of a fixed habitation. Hence the ancient nations, amongst which this art originated, held it in the greatest veneration. The Egyptians considered it as a gift from their gods, and even paid divine honors to the ox, on account of his usefulness in agricultural labors. The ancient Romans venerated the plough, and in the earliest and purest times of the Republic, the greatest praise of an illustrious citizen was, to be called an industrious and skillful husbandman.

We learn from the writings of Moses, that agriculture was the primitive employment of man. The earth no longer yielded her productions spontaneously after the fall. It had been cursed with barrenness for Adam's transgression ; and, under the new constitution of things, could be made to minister to his wants, only by patient toil, and careful and assiduous cultivation. He was therefore "sent forth from the garden of Eden to till the ground ;" and it is probable that Adam and his immediate descendants were instructed in this art by God himself.

In the early ages of the world, before mankind had become very numerous, and whilst every tribe or family could range over a large extent of country, their principal wealth consisted in flocks and herds, and their chief employment in the care of them. This continues to be the condition of the Nomade nations of Northern Asia to the present day ; and under such circumstances agriculture is but little attended to. The Egyptians were undoubtedly the first people, who applied themselves successfully to the cultivation of the earth ; and they were invited to it by the extraordinary fertility and productiveness of their soil, occasioned by the annual overflowings of the Nile. The wealth and power which they acquired from this source, and their extraordinary advances in knowledge and the arts, are fully attested by those wonderful monuments still remaining of their former greatness. The Greeks probably borrowed their agriculture, as they did their arts and early principles of science from the Egyptians. The Chaldeans and Phœnicians held husbandry in the highest estimation. The Carthagenians, descended from the latter, carried it to great perfection. The Romans devoted themselves to agriculture with extraordinary zeal and success ; and several of their treatises on this subject are still extant. In fact all the celebrated states of antiquity rivalled each other in promoting and improving this important art.

During the ages of anarchy and barbarism, which succeeded the fall of the Roman empire, agriculture was almost wholly abandoned.

The wild hordes which successively overran and subdued the fairest portions of the earth, had little knowledge of, and still less inclination for husbandry. Like all savages, they had the greatest aversion to labor, and their only delight was in idleness and debauchery, war and the chase. Long time is required to change the character and habits of a people, and accordingly agriculture, together with all the useful arts, languished for centuries. But when at length new light began to break in on the nations, it could not fail to attract the earliest attention, and has been advancing to perfection, and acquiring fresh importance to the present time.

Agriculture is now probably better understood, than it was by any of the ancient nations. The application of modern science, particularly chemistry, to it, has greatly accelerated its improvement. Britain, especially during the last half century, has made the greatest efforts to advance her husbandry; and with signal success. The value of her agricultural products has doubled during this period, and actually exceeds those of France, though that country has twice the territory, a third more population, greater natural fertility, and a climate adapted to every variety of vegetable growth. The French agriculture, previous to the revolution, suffered, in common with other species of industry, from the effects of bad government, and a worn out and antiquated system opposed to all change, and therefore hostile to improvement. But, a better state of things has succeeded that great event. The large domains have been broken up and divided, small farms created, vexatious regulations, and burdensome impositions removed, and a general spirit of enterprise and inquiry excited. Lombardy and Flanders have long been celebrated for their flourishing agriculture.

England is indebted to the Flemish farmers, who came over to that country as far back as the Norman conquest, for many valuable improvements. In all parts of Germany, increasing attention is paid to this subject, both by the governments, and by enlightened individuals. Nor, has the general spirit of improvement been confined to Europe. In our own country, the condition of agriculture is rapidly meliorating. Societies for the diffusion of useful information have been created, better modes of tillage have been introduced, improved breeds of domestic animals procured, new articles of cultivation recommended, and men of intelligence and capital are more and more devoting themselves to this most healthful, interesting, and important of all human employments.

AIR. In Natural Philosophy, is that fluid, transparent substance which surrounds our globe, reaching to a considerable height above its surface; and this ocean of air is the great laboratory in which most of the actions of life go on; and on the composition of which they depend. Though invisible, except in large masses, without smell or taste, yet it is a substance possessing all the principal attributes of

matter ; it is impenetrable, ponderable, compressible, dilatable, perfectly elastic, and its particles are operated on like those of other bodies, by chemical operations. It is indispensable to the life of all organic beings ; animals respire it incessantly, and decompose it ; a part of its oxygen is transformed into carbonic acid, and this combination produces caloric, which contributes principally to the preservation of animal heat. Vegetables imbibe the carbon which the carbonic acid, diffused through the air, contains. The air is the agent of combustion ; the particles of bodies combine with its oxygen and evolve light and heat. Air is also the principal medium of sound.

AIR-BELLS are enlarged cavities in the cellular tissues of plants, to produce buoyancy, if they are of the aquatic order. In birds they are membraneous cavities communicating with the lungs, and traversing all parts of the bird, even to the interior of the bones and quills.

AIR-PUMP. A machine for exhausting the air out of vessels, in the same manner as water is drawn up by a pump. The vessel from which the air is thus exhausted is called the receiver, and the space thus left vacant in the vessel, after withdrawing the air, is called a vacuum. It is one of the most curious and useful of philosophical instruments. By experiments with it, the weight, elasticity, and many other properties of the air may be shown in a very simple and satisfactory manner. If any animal is placed under the receiver, and the air exhausted, it dies almost immediately ; a lighted candle under the exhausted receiver immediately goes out. Air is thus shown to be necessary to animal life and combustion. A bell suspended from a silken thread beneath the exhausted receiver, on being struck, cannot be heard. If the bell be in one receiver, from which the air is not exhausted, but which is within an exhausted receiver, it still cannot be heard. Air is therefore proved necessary to the production and to the propagation of sound. A shrivelled apple or cranberry, placed beneath an exhausted receiver, becomes as plump as if quite fresh. They are thus shown to be full of elastic air.

AJACIO. An extraordinary tree, that grows on the shores of the Antilles Islands. St. Pierre states, on the authority of Labat and du Tetre, that it grows to such a prodigious size, that out of one log of it a boat can be made capable of carrying forty men. This tree is also the only one, of those shores, which is never attacked by the sea worm, an insect so formidable to every other species of timber which floats in those seas, that it devours whole squadrons in a very little time, and occasions the necessity of sheathing the bottoms of the vessels with copper.

ALABASTER. A well known mineral, used by architects, statuaries, plasterers and others. It is a sulphate of lime. Alabaster is found of various colors and kinds ; snowy white, yellow, variegated, reddish, and in masses of various shapes and sizes. Most of the alabasters are interspersed with veins of different colors. Alabaster is

found in many different parts of the world, and in abundance in several places of England. In general, it is so soft, that it can be cut with a knife; yet it admits of a fair polish. The clearness and fineness of this stone renders it in some measure transparent, whence it has been occasionally employed for windows. There is a church in Florence still illuminated by alabaster windows; instead of panes of glass, there are slabs of alabaster nearly fifteen feet high, each of which forms a window, through which the light is conveyed. When a candle or lamp is put into a vase of this kind, it diffuses a very agreeable and delicate light, and is therefore much used for that description of statuary.

ALBUMEN. A colorless insipid fluid, coagulating at a heat of 120° , existing in the leaves, juices, and fruits of most plants, but most abundant in animal products. The white of eggs is nothing but pure albumen, and the blood contains large quantities of the substance. Its principal use, in domestic economy, is in classifying or cleansing fluids, such as dissolved sugars, and for which purpose it is unrivalled. Milk contains albumen, and, hence, is sometimes used for cleansing syrup, but it is inferior to the white of eggs. These carefully incorporated with a fluid when cold, and then submitted to a coagulating heat, will lift all impurities to the surface, where they can easily be taken of by skimming. Albumen is more abundant in the bark of red or slippery elm, than in any other vegetable product. Hence its value for medicinal purposes. Albumen is composed of carbon 52 parts, oxygen 23, hydrogen 7, and nitrogen 15.

ALBURNUM. Wood of trees is usually composed of three distinct parts; the pith or central part, having a loose spongy texture; the heart wood, the most durable and valuable part of the tree; and the sap wood or alburnum. This last is usually whiter than heart-wood, is more porous, and through it the circulation of the sap is principally performed. It is the soonest attacked by the borer or powder-post, and in exposed situations is always first to decay.

ALCOHOL. This is the purely spiritous part of all liquors. It is the product of vinous fermentation, and can be derived from all substances capable of fermentation. It is the intoxicating principle of liquors, and few nations have been found so rude as not to have discovered some means of producing it. Alcohol is produced principally by the distillation of wine, molasses, and grain. The product of the first is brandy, the second rum, and the third whiskey or gin. Alcohol is of much use in the arts, but it has, by its general use, produced a most unhappy effect on the happiness and morals of multitudes. Perhaps greater quantities of distilled spirits are used by the nations that border on the Baltic than in any other part of the world, and here they are principally produced from the distillation of potatoes. Alcohol is present in brandy, whiskey, and other strong spirits,

to the extent of fifty per cent.—in cider and ales ten per cent.—and in beer six per cent.

ALDER. The alder is a tree which grows in wet situations, and is distinguished for its flowering stalks being branched. The roots and knots furnish beautifully veined wood, nearly of the color of mahogany, and well adapted to cabinet work. The bark may well be used in the operations of tanning and leather dressing. It is also sometimes used, together with the young twigs, for dyeing, and yields different shades of yellow and red. With the addition of copperas it yields a black dye. The Laplanders chew the bark of the alder, and dye their leather garments red with the saliva thus produced.



THE ALDERNEY COW.

ALDERNEY CATTLE. The cattle called by this name, on some accounts deserve distinct notice. They are of French origin, either from the continent or French islands adjacent to the Continent; but receiving this name from the English island in the British Channel, called Alderney. These cattle mostly prevail in Hampshire, along the coast in the south-west part of England. They are generally of a mingled white and sandy red, or fawn color; the latter being mostly disposed in large, abrupt patches. In form they are of small size and awkwardly shaped—the neck thin, bones small, high shoulders, and short rump. They are a variety of the short-horns, and are sometimes, but not generally, called Normandy cattle.

The cows yield only a small portion of milk, but it is of the most extraordinary richness ; and, on this account, and perhaps for their peculiar figure and color, they are often kept in the parks and pleasure-grounds of the opulent, where they are judged both useful and ornamental. Their gentleness, their diminutive size, and even their singular contour, together with the excellence of their milk, render them favorites, where no remunerating return for their keeping is expected or desired. In proportion to the quantity of milk, the butter it yields is astonishing ; a single cow has been known to give nineteen pounds of butter weekly for several weeks in succession. This, of course, is a very rare occurrence ; the average is from six to eight or nine pounds weekly, during the season, supposing the cow to be first-rate of her kind.

ALICONDA. An African tree of Congo, of immense bulk. Of the bark a coarse thread is made ; the shell or rind of the fruit may be made into a nourishing pap, serves for vessels of various kinds, and gives an aromatic taste to water preserved in it. The small leaves are used as food in time of scarcity, the large ones to cover huts, and, being burned, makes good soap.

ALKALIES. Alkalies are saline substances possessing a hot and caustic taste, and readily corrode the flesh of animals ; they also convert vegetable blue to a green color, are soluble in water, and combine in various ways with acids, forming a variety of new bodies of very different qualities. With oils they form soaps. They are known under two forms, the *fixed* and *volatile*. The fixed alkalies are potash and soda ; the volatile alkali or Ammonia, is obtained from animal matter ; and latterly, it has also been procured in large quantities from the distillation of coal for gas. The fixed alkalies, potash and soda, are products of the vegetable kingdom ; and used largely both in medicine and the arts, chiefly in medicine, in combination with acids forming neutral salts. Soda is also obtained from the salt of the sea and that of mines.

ALLUVION. Land deposited by the action of rivers ; either at the mouths in lakes or the sea, or on the banks in their passages to these receptacles. Constituted as it usually must be of the richer and lighter parts of the regions drained by the river that deposits it, it is the most fertile of soils, and the most valuable when it can be drained, or rendered secure from floods. Nearly the whole of Holland is alluvial. In this country the vast tract on both sides of the Mississippi, for a great distance from its mouth, is of this character ; but owing to its annual submersion is of comparative little value. Perhaps there is no river in the United States, in proportion to its length and volume, that has so much valuable alluvion on its borders as the Genessee in New-York.

ALTERNATION. In agriculture this term means the system

in which one portion of the farm is in pasture and another arable; and these being successively changed.

ALUM. A fossil salt, and mineral, of an acid taste, which leaves in the mouth a sweetness, accompanied by an astringency so considerable as to cause a sensation of shuddering. There are two sorts of alum, the natural and the artificial. In a natural state, it is said to be met with in Egypt, Sardinia, Spain, Bohemia, and other places, and the counties of York and Lancaster, in England. On account of its binding qualities, it is used in several mechanic arts, and in medicine. In dyeing, it fixes and brightens colors; it constitutes the basis of crayons; it gives hardness and consistence to tallow, in the manufacture of candles; and wood, soaked in a solution of alum, being incapable of taking fire, and answering the purpose, also, of excluding the air is used for powder magazines.

ALUMINE. One of the earths most important to the agriculturist, and entering largely into the composition of all rocks, clays, and loams. It is the principle that gives peculiar tenacity and plastic nature to clays; rendering them heavy and impervious to water, in proportion to the quantity contained in them. Alumine has a great affinity for water, hence clay lands are usually more cold and wet, and more difficult to cultivate than those into which it enters in less proportions. Its presence in soils is, however, absolutely necessary to prevent porosity; and when combined in due proportion with other principal earths it constitutes one of the surest ingredients of a fertile soil. Much attention has of late been paid to the amelioration of clay soils, and of all the methods tried, thorough draining has proved the easiest and most effective. When clay land is drained, its texture is changed; and the plants it naturally produces, as well as those it is made capable of producing, are of a higher and more valuable kind. Alumine is of much use in the arts; it is extensively employed as a cleaning powder; as a mordant in dyeing; and is the basis of bricks, crucibles, and porcelain.

AMMONIA. A transparent, colorless gas, of about half the weight of common water, with an exceedingly pungent smell, extinguishes flame, and is fatal to life. It derives its name from the fact that the ancients received it from that part of Lybia in which the temple of Jupiter Ammon was situated; or from Ammonia, one of the Cyreniac territories. It is the same substance as "spirits of hartshorn," employed for smelling bottles. To the agriculturist ammonia is particularly interesting, because those substances that contain the most of it are the most efficient manures, and act with the most certainty and promptness. It is produced from soft or fluid animal substances while in the process of decomposition, and this change is rapid in proportion to the quantity of earthy salts they contain.

AMPHIBIA. A class of animals which live equally well in air or water; such as the phocæ, or seal tribe, frogs, lizards, crocodiles, eels, water serpents, and snakes. They are remarkable for their tenacity of life; some will continue to move, even when the head is cut off.

ANALYSIS. The separation of a compound body into its constituent parts; a resolving; as, an analysis of water, air or oil, to discover its elements. This is what is called chemical analysis. Indeed, to analyze bodies, or resolve them into their component parts, is the chief object of chemistry. When it is applied to the soils it is the means of ascertaining the nature, properties, and proportions of which they are composed. This chemical examination of the soil affords perhaps more certain and more valuable information to the farmer, for the improvement of its fertility, than any mode of investigation. It is to the agricultural chemist the same as an examination of the pulse, the tongue, and the excrements to the physician in ascertaining the physical condition of the human system. One is as necessary to the former, as the other is to the latter.

ANESNOSCOPE. Every contrivance which indicates the direction of the wind is called by this name. The vane upon towers and roofs is the simplest of all anesnosopes. There are some, also, where the vanes turn a moveable spindle, which descends through the roof to the chamber where the observation is made. On the ceiling of this apartment a compass-card is fixed, and, whilst the wind turns the vane together with the spindle, an index, fixed below, points out the direction of the wind on the card.

ANGORA GOAT. A species of goat, so called, because found in its highest excellence in the neighborhood of Angora, a city of ancient Syria. They are of dazzling white color, and, in all, the hair is very long, thick, fine, and glossy; which is indeed the case with almost all animals of Syria. There is a great number of these animals about Angora, where the inhabitants drive a trade with their hair, which is sold either raw or manufactured, into all parts of Europe. Nothing can exceed the beauty of the stuffs which are made from the hair of almost all the animals of that country. These are well known by the name of camlet. The great antiquity of this kind of manufacture is evident; as we are told in sacred scripture, that the curtains of Moses' tabernacle were made of goat's hair, probably of the Angora goat.

ANIMALCULE. In its general acceptance, this is a little animal; but since the invention of the microscope, the term is particularly applied to the myriads of insects, too small to be seen by the naked eye, which are discovered by that instrument. The shape of animalcules is infinitely diversified; one is a long slender line; another is coiled up like an eel or serpent; and some are circular, elliptical, or globular. Vinegar is full of these minute eels. They are

also found in paste. Müller conceives that the sea abounds in animalcules peculiar to itself; and Spallanzani observes that vegetable substances dissolving in sea water produce swarms of animalcules. The minuteness of them surpasses the conception of the human mind. Leeuwenhoek calculates that the size of some is to that of a mite, as the size of a bee to that of a horse; a hundred others will not exceed the thickness of a hair; and ten thousand of a different species may be contained in the space occupied by a grain of sand.

ANIMAL MANURES. That of young animals is poorer than that of the aged, for the young and growing animal requires, for its nourishment and increase of size, a greater proportion of the phosphate of lime, and other solid ingredients of its food, than the more aged animal, because the excrements or refuse matters of the vegetables consumed are proportionately diminished in quantity and in richness. The richer the food, too, the better is the quality of the manure. That from animals fed on oil-cake is the richest, then that of corn-fed animals; and, lastly, that from straw-fed cattle is the poorest.

ANIMAL POISONS. Several animals are furnished with liquid juices of a poisonous nature, which, when injected into fresh wounds, occasion the disease or death of the animal wounded. The poison of the viper is a yellow liquid, which lodges in two small vesicles in the animal's mouth. These communicate by a tube with the crooked fangs, which are hollow, and terminate in a small cavity. When the animal bites, the vesicles are squeezed, and the poison forced through the fangs into the wound. If the vesicles be extracted, or the liquid prevented from flowing into the wound, the bite is harmless. The venom of the bee and the wasp is also a liquid contained in a small vesicle, forced through the hollow tube of the sting into the wound inflicted by the instrument. From the experiments of Fontana we learn that it bears a striking resemblance to the poison of the viper. The sting of the bee should be immediately extracted; and the best application is opium and olive oil.

ANNUAL. This term is applied to plants that arrive at maturity in a single year, and then perish. The stem of annuals is generally of rapid growth, porous, and abounding in the juices necessary to the perfection of the seeds in a single season. The herbage of some plants is annual, while the roots are perennial, or remain from year to year. Maize, or Indian corn, is a proper example of an annual; the grasses, of perennial roots with annual herbage.

ANTIMONY. A blackish mineral substance found in different parts of Europe, as Bohemia, Saxony, Transylvania, Hungary, France, and England; commonly in mines by itself, intermixed with earth and stony matters. Sometimes it is blended with the richer ores of silver, and renders the extraction of that metal difficult, by volatilizing a part of the silver. The name of this metal is usually referred to Basil Valentine, a German monk, who, as the tradition

relates, having thrown some of it to the hogs, observed, that after purging them violently, they immediately grew fat upon it. This made him think, that by giving his fellow monks a like dose, they would be the better for it.

The experiment, however, succeeded so ill, that they all died of it; and the medicine was thenceforward called *antimony*—*anti-monk*. Antimony at first was used only in the composition of paint. Scripture describes it a sort of paint with which the women blackened their eye-brows. Its modern uses are very numerous and important. It is a common ingredient in specula or burning concaves, serving to give the composition a finer texture. It makes a part in bell-metal, and renders the sound clearer. It is mingled with tin to make it harder, whiter, and more sonorous; and with lead, in the casting of printers' letters, to render them smoother and firmer. It is also a general help in the melting of metals, and especially in the casting of cannon balls. It is likewise made use of for purifying and heightening the color of gold.

For a long time this mineral was esteemed poisonous. In 1566, its use was prohibited by any but doctors of the faculty. It is now universally allowed that pure antimony in its crude state has no noxious quality, and that though many of its preparations are most virulently emetic and cathartic, yet by a slight alteration or addition, they lose their virulence, and become mild in their operation. Its virtues in the diseases of animals are greatly extolled.

ANTIPODES. In geography, a name given to those inhabitants of the globe, that live diametrically opposite to each other. The antipodes lie under opposite meridians and opposite parallels, in the same degree of latitude, but of opposite denominations, one being north, and the other south. They have nearly the same degree of heat and cold, and days and nights of equal length, but opposite seasons. It is noon to one, when it is midnight to the other; and the longest day with the one, is the shortest with the other. The terms upward and downward are merely relative, and signify nearer to, and farther from, the centre of the earth, the common centre to which all heavy bodies gravitate: wherefore, our antipodes, or the people who with respect to us, seem to walk with their heads downward, have not their feet upward, nor their heads downward, any more than ourselves; because they, like us, have their feet nearer to the centre of the earth, and their heads farther from it. We all tend toward the centre of the earth, in a direction from head to foot.

APHIS. A family of insects that prey extensively on plants, and are endowed with astonishing powers of reproduction, and though insignificant as individuals, they are formidable in their numbers, and in most years occasion more or less loss to agriculturists. They have no mouths, but are provided with beak-like suckers, which they insert into plants, and feed on the juices. Almost every

cultivated tree or plant has its peculiar family of aphids; and those trees or shrubs that are wild, or found only in the depths of the forest, cannot claim exemption. Soap suds and a strong decoction of tobacco, have been deemed most effectual in destroying them; though when a foothold is once obtained, from their rapid multiplication extermination is difficult.

APIARY. This is a garden or place where bees are kept, and derives its names from *apis*, which signifies a bee. The ancient as well as modern writers on bees agree in recommending a southern aspect as the most proper for this purpose; as a general rule, beehives should be placed in such situations as are little exposed to the wind, and enjoy as much of the influence of the sun as possible; as wind always retards the bees in their work, while the sun's beams invite them to it. Thus, though it be well known, that bees will thrive well in high and windy situations, a low one is obviously always to be preferred. In the vicinity of the apiary, there should constantly be abundance of flowers, from which the bees may collect their wax and honey. Mr. Bonner, a late writer on the management of bees, observes, that were a choice allowed him where to place his bees, it should be in an easterly situation, a hollow glen by the side of a rivulet, surrounded with abundance of turnips in blossom in the spring, mustard and clover in summer, and heath in the latter end of autumn and harvest; with a variety of other garden and wild flowers in their seasons.

It is not, however, to be understood from this, that bees will not thrive unless they are placed in such an advantageous situation, as the contrary can, he says, be proved; for bees have thriven amazingly well in places where they were not within reach of any of the above mentioned flowers; but although they will do well in most situations, and fly far for their food, yet they will thrive far better when situated among or near good pasture, and surrounded with plenty of food. And Mr. Keys properly remarks, that the hives should be clear from the droppings of trees, and the annoyance of dunghills, long grass and weeds, as by these means insects are bred which are not only destructive to the bees, but which greatly retard them in the preparation of honey.

Great improvements may be made in providing plenty of pasture for bees, and as a rich corn country is unfavorable to their industry, the practice of other nations, in shifting the abode of their bees, is deserving of notice. M. Maillet, in his description of Egypt, informs us, that the natives of that fertile country annually send their bees into distant regions, to procure sustenance for them, when they cannot find any at home. About the end of October, the inhabitants of Lower Egypt embark their bees on the Nile, and in this extraordinary Apiary convey them to upper Egypt, when the inundation is withdrawn, the lands are sown, and the flowers beginning to bud. These

insects are thus conducted through the whole extent of Egypt ; and after having gathered the rich produce of the banks of the Nile, are re-conducted home, about the beginning of February.

In France, floating bee-hives are very common. One barge contains from sixty to a hundred hives, which are well defended from the inclemency of the weather. Thus the owners float them gently down the stream, while they gather their honey from the flowers along its banks. A single bee-house, or Apiary of this kind, yields the proprietor a considerable income.

APIS. The character of the honey bee, or apis, has been the subject of anxious investigation for ages ; and unquestionably more singularities are exhibited by it than by any other insect, or perhaps by any other animal, hitherto known. A single female lays the foundation of a numerous colony ; she produces eggs which will become males, females, and neuters or working-bees ; for the females and males are engaged in nothing but perpetuating the race, while the neuters collect the honey and fabricate the combs. By some unaccountable law, her impregnation cannot take place within the hive. If delayed beyond twenty days from the origin of her own existence, instead of laying eggs, which produce the above variety of her species, she will never lay any than those which will be hatched into males. In the natural state, where there has been no delay, she lays numbers of them, it is true ; but invariably after having produced thousands that give birth to workers. Two queens cannot exist at once in the same hive ; it is indispensable to the safety of the colony that one of them be destroyed ; and in the bitterness of their combats, sometimes both become victims of their mutual resentments.

But without a queen the colony goes speedily to decay ; the workers, however, possess the secret of converting a common worm, which would hence become one of themselves, into a worm which will become a queen, and the hive is thus preserved. The males are mercilessly massacred by the workers at a certain season, unless a queen be accidentally wanting, and then they are spared. The workers testify the greatest regard for the queen ; some attend her wherever she goes, surround her, supply her with honey, and brush her limbs ; others keep a vigilant watch day and night at the entrance of the hive ; nothing is permitted to enter without due and cautious examination ; others are employed in providing for the necessities of the young worms, in sealing the cells, or in building the combs. Our admiration of their art should rise still higher than it does, on reflecting that these beautiful and delicate structures, which often yield to the slightest pressure, are all made perfect and complete in total darkness.

APPLE TREE. One of the most valuable fruit trees in the world ; this excellent tree is said to have been brought into Italy from Syria and Africa, a very few years before the nativity of our Saviour.

Apple trees should be kept from their first growth pruned in such a manner as to spread very much, rather than to run up tall; they should be cleared from limbs which stop and choke out the free circulation of the air. From May to November, manure enough to smother and kill the grass, should be put about the stems of the young trees; but after the beginning of November, it should carefully be removed, as the field mice would otherwise gnaw the bark, and spoil the trees.

All good apples, and many of the common kinds, are produced by the process termed grafting. This is performed by inserting young twigs or shoots from trees bearing fine fruit into stocks of inferior kinds, raised upon every farm, from the pomace of the cider-mill. Crab-stocks are thought to answer best in England, but all kinds are made use of in the United States. The branches formed by the twig inserted are found to bear fruit corresponding in quality to the tree from which it was cut. The same process is pursued with all other kinds of fruit-trees; for inoculated or ingrafted fruit is always found to be the best.

The kinds of apples most highly prized in all countries are the varieties of pippin. The pippins of New York, New Jersey and Pennsylvania are the richest in flavor of any apples known in the U. States; while the greening, the pearmain, and gilliflower, are the best fruit of New England; and the varieties of russet-apple the most lasting, being often found in a good condition at midsummer of the next year. Among the more recent varieties are Early Harvest, Baldwin, Summer Rose, Summer Pearmain, Seek-no-further, Lady Apple, Wine Apple, Bellflower, Vandevere, Nonsuch, Early Strawberry, Red Astracan, Gravenstein and Porter. The common family uses of the apple are too familiar to need specification; but its most important application is to the manufacture of cider. The process for making the best cider is simple; perhaps quite as much so as any mode of spoiling it. They should be ground in a mill till they are entirely bruised. They are afterwards allowed to stand a day or two in open vessels or troughs, and then pressed between haircloths or layers of clean straw; the last is not so good, from absorbing and wasting a portion of the juice. The liquor running from the press is then received into a vat, or large casks, till it has fermented, when it is drawn off, and placed in clean, tight barrels or casks, to stand till it is fine and clear; it is then racked off from the lees, and kept in casks or bottled for use. A portion of brandy and a little flowers of sulphur render it more pure, and less likely to grow hard and sour.

APRICOT. A fruit of the plum tribe, which grows wild in several parts of Armenia, and was introduced into England about the middle of the sixteenth century. Some consider the apricot the most delicate of all our hardy fruits. For pastry, certainly none is more excellent. It is used for tarts, both green and ripe; it is also preserved with sugar in both these states, and is sometimes dried as a sweet-meat-

Care should be taken to gather it before it becomes soft and mealy. The kernels of apricots have a pleasantly bitter flavor, and answer much better, for several purposes in confectionary than bitter almonds, which are commonly used. They likewise contain a sweet oil, which, like that of almonds, was formerly used in emulsions. The gum that issues from the apricot-tree is similar to that of the cherry. The wood is coarsely grained and soft, and is consequently seldom used in carpentry. Apricot-trees are chiefly raised against walls, and are propagated by grafting upon plum tree stocks.

APRIL. The fourth month of our year receives its name from the Latin word, *aprilis*, and that from *aperio*, "to open," because the buds now expand into leaves. The suddenness with which most trees and shrubs become covered with foliage, affords at once pleasure and surprise. April is, however, a fickle and changeable month; its day has been called by poets, "many weathered;" consisting often of sunshine, storm, rain, and sometimes snow.

AQUATIC. Plants that live and flourish in the water are termed aquatic. There are also aquatic animals and birds. All our lakes, rivers, and the ocean furnish specimens of aquatic plants, some of which are of great use and value. A large part of the soda of commerce is obtained from a sea-weed, which, drifted ashore, is dried and burned for the soda of the ashes. Hundreds of square miles in the equatorial Atlantic, at some seasons of the year, are covered with this marine vegetation. Some sea-weeds, as the algæ, that grow as they float in the water, attain a length of several hundred feet. The rice plant of the East Indies and the Carolinas, is an aquatic plant, and probably contributes as much to human subsistence as any plant on the globe. The wild rice, *Zizania aquatica*, of our northern lakes and rivers, is of great service to the native tribes of those regions, feeding the immense quantities of water fowls of all kinds that visit and breed in those inhospitable climes, as well as furnishing food to the natives themselves when their usual supplies from other sources fail them. The flags, rushes, and other grasses that grow in the waters of the lakes, or other quiet waters—also the pond lily, are further examples of aquatic plants.

ARBOR VITÆ. This is an evergreen of small size, but very durable. It abounds in the northern States, and has by some been recommended as a hedge. It is used in Canada for brooms; and it is also used for medicinal purposes, as well as for ornament on lawns and court yards.

ARGILLACEOUS. A term applied to soils in which clay forms a principal ingredient. It was derived from *argil* or clayey, as aluminous is derived from alumine. In agriculture, argillaceous and aluminous are words of the same import, and mean soils or earth in which clay predominates. Analysis shows how the proportions can be determined.

ARTESIAN. A kind of well made by boring through successive strata of the earth until water is found. This name is derived from Artois in France, where the system was first successfully adopted. By penetrating the rocky crust of the earth in this way, the water frequently rises to the surface, and flows a living stream; in other cases it rises so as to be obtained without difficulty. In this country wells have been bored to the depth of a thousand feet, and those of five hundred and seven hundred are not uncommon. Various products have been obtained from the earth in this way. In Albany a valuable mineral spring has been reached by boring. The great quantities of water at the Kanawha salines are obtained from Artesian wells. Springs of carbonated hydrogen, that burn with perpetual flame; and immense reservoirs of petroleum have been discovered while boring for salt or fresh water. Artesian wells have been sunk in the deserts between Cairo and Suez, and abundant supplies of water obtained; and wherever the borings have been properly and perseveringly conducted, either in this or foreign countries, water has usually been procured.

ARTICHOKE. The artichoke is a well known plant, which is cultivated in Europe chiefly for culinary purposes. This plant was cultivated in England as early as the year 1580. The parts that are eaten are the receptacle of the flower, which is called the *bottom*, and a fleshy substance on the scales of the calyx. The choke consists of the unopened florets and the bristles that separate them from each other. These stand upon the receptacle, and must be cleared away before the bottom can be eaten. Its name undoubtedly arose from a notion, that any one, unlucky enough to get it into his throat, must certainly be choked. In England, artichokes are generally boiled plain, and eaten with melted butter and pepper, and are considered both wholesome and nutritious. The bottoms are sometimes stewed, boiled in milk, or added to ragouts, French pies, and other highly-seasoned dishes. For winter use, they may be slowly dried in an oven, and kept in paper bags, in a dry place. On the continent, artichokes are frequently eaten raw with salt and pepper. By the country people of France, the flowers of the artichoke are sometimes used to coagulate milk, for the purpose of making cheese. The leaves and stalk contain a bitter juice, which, mixed with an equal portion of white wine, has been successfully employed in the cure of dropsy, when other remedies have failed. The juice, prepared with bismuth, imparts a permanent gold color to wool.

The Jerusalem artichoke is a somewhat potato-shaped root, produced by a species of sun-flower, which grows wild in several parts of South America. This plant bears single stalks, which are frequently eight or nine feet high, and yellow flowers, much smaller than those of the common species. So extremely productive are these valuable roots, that between seventy and eighty tons weight of them are said

to have been obtained, in one season from an acre of ground. They succeed in almost every soil ; and, when once planted, will continue to flourish in the same place, without requiring much manure, or much attention to their culture. The season in which they are dug up for use, is from about the middle of September till November, when they are in the greatest perfection. After that they may be preserved in sand, or under cover for the winter. The roots are generally eaten plainly boiled, but they are sometimes served at table with fricassee-sauce, and in other ways. Their flavor is so nearly like that of the common artichoke, that it is difficult to distinguish one from the other. We are informed that Jerusalem artichokes are valuable for hogs and store pigs ; and that, if washed, cut, and ground in a mill similar to an apple-mill, they may also be given to horses.

ASHES. When wood is burned in a position that excludes the air, the product is coal ; if the combustion is performed in open air, the produce is ashes. Ashes by being leached, or having warm water passed through them, are deprived of the alkali they contain, and this is obtained in the shape of potash, or soda, by evaporation. Different woods, and plants, vary much in the quantity of ashes and alkali they produce ; the fir, beech, and poplar, ranking among the lowest ; and the box, willow, elm, wormwood, and fumitory the highest.

Leached ashes are found to be an excellent manure applied to soils that are light, or such as are inclining to be sour ; the alkali correcting the acid with which such soils, as the vegetation proves, abound. In some instances, crops of grain, roots, and grass, have been nearly doubled by their use ; and no skilful agriculturist permits their waste.

ASP. A very small kind of serpent, peculiar to Egypt and Lybia, the bite of which is deadly. Its poison is so quick in its operation, that it kills without a possibility of applying any remedy. Those that are bitten by it are said to die within three hours, by means of sleep and lethargy, without any pain ; wherefore Cleopatra chose it as the easiest way of despatching herself.

ASPARAGUS. There are thirteen species of this plant ; but the only one cultivated in the garden is the common asparagus, with an upright herbaceous stalk ; bristly leaves, and equal stipula. The other species are kept only for the sake of variety. The plants being raised from seeds, after having acquired a period of three or four years' growth, produce proper sized asparagus, of which the same roots furnish an annual supply for many years, continuing to rise in perfection for six or eight weeks in the summer season, the shoots afterwards run up to stalks and flowers, and perfect seeds in autumn. But besides the crop raised in the summer season, it may also be obtained in perfection during the winter, and early in the spring, by the aid of hot-beds.

Asparagus is always three years at least, from the time of sowing the seed, before the plants obtain strength enough to produce shoots of due size for the table ; that is, one year in the seed-bed, and two after being transplanted, though it is sometimes three or four years after planting before they produce good full-sized shoots. But the same bed or plantation will continue producing good asparagus ten or twelve years, and even endure fifteen or twenty years. However, at that age the shoots are generally small, and the whole annual produce inconsiderable.

Asparagus offers a striking instance of the effect produced on plants by cultivation. In some parts of Europe it is found growing wild on the sea shore, its stem not thicker than a goose quill, and only a few inches in height. The cultivated plant is sometimes found three-fourths of an inch in diameter, and grows to six feet in height. In the neighborhood of cities or villages asparagus is cultivated as a source of great profit ; and it should find a place in every kitchen-garden. In the year 1850 and 1851 the asparagus sold from the farm of D. D. T. More, near Albany, N. Y., yielded over one hundred and forty-two dollars.

ASS. This is an animal of the equine genus. It has long slouching ears, a short mane, and a tail covered with long hairs to the end. It is usually of the ash color, is extremely hardy, and is easily kept. It is a native of Arabia, Persia, and the central parts of Asia and Africa. Like the horse, when wild, it goes in large troops, and displays great natural sagacity, activity, and courage. Jennets, or she-asses, are used among us principally for breeding jacks, or the males of the species, and the latter are for the breeding of mules, the hybrid product of the ass and the mare. The ass is but little used for labor in this country, and they are not numerous.

ASSIMILATION. This is a term, in animal and vegetable economy, to denote that hidden, natural process, by which living animals and plants are enabled to convert such bodies as have a certain affinity for them, or at least after having undergone some preparation and change of properties, into their own substance and nature.

ASTRINGENT. This is a medicinal substance which binds or contracts the parts of the body to which it is applied, restrains profuse discharges, coagulates animal fluids, and condenses and strengthens the solids.

ATMOSPHERIC AIR. The atmosphere, which was formerly supposed to be a simple fluid, is composed of two distinct substances, termed oxygen gas and nitrogen gas. It is not a chemical *compound*, but a mere *mixture* of those gaseous substances, in the proportion of 21 of the former and 79 of the latter. It contains also about one part in every thousand of carbonic acid gas, a considerable portion of water in a state of elastic vapor, and several adventitious substances.

ATOM. A part or particle of matter, so small as not to admit of farther subdivision. The Epicureans professed to account for the origin and formation of all things, by supposing that these atoms were endued with gravity and motion, and thus came together into the different organized bodies that we now see. This was called the atomical philosophy, which was adopted by the sceptics and infidels of those times.

AUGUST. The eighth month, from *Augustus*, Latin: the term implies majestic or grand, and was first given to Octavius, the Roman emperor, he being named Augustus Cæsar in consequence of his victories. This month was therefore dedicated to his honor, and still goes by his name.

This is the harvest month in this as in most temperate European countries. The harvest, chiefly, it should be observed, the wheat harvest, used almost universally to be finished by a feast called *harvest-home*, when, for a few hours, the master and the servant was forgotten, and both mingled in social companionship. Modern manners have, however, a good deal contracted such intercourse; and although harvest-home be not quite abolished in agricultural districts, we fear it is greatly on the wane.

Many fruits, among which may be named the apricot, are now fully ripe; plums, peaches, and nectarines may now also be obtained. Of flowers and flowering shrubs, natives of foreign climes, many may now be seen of great beauty; such are African marygolds, China asters, persicarias, chrysanthemums, dahlias; the clematis, or virgin's bower, adorns the cottage porch. Geraniums and hydrangeas are now also in their greatest glory; so also is the passion flower.

Our song-birds, the thrush, the lark, and red-breast chiefly excepted, are for the most part silent during this month; some of the migratory birds assemble in flocks previous to departure.

AWNS. The long, bristle-like terminations of the envelope of the kernel in some kinds of plants is termed the *awn*, or beard. It is particularly conspicuous in some kinds of winter wheat, in most varieties of spring wheat, and in all the kinds of barley. Wheat without beards can be converted into the bearded, and vice versa, by changing the sowing from autumn to spring, or from spring to autumn. Of all grains, barley is the most liberally provided with this formidable appendage.

AYRSHIRE CATTLE. These cattle derive their name from the county of Ayrshire, in the west of Scotland. The origin of the variety is not well understood, but it is supposed that at some period it embraces a cross of the Durham and Alderney. This breed became established about the middle of the last century, or between the middle and the end of it, and is now scattered over England, Wales, and Ireland in large numbers. It is also found in the United States. Here it is becoming a favorite with some of our best

dairymen. It is particularly valuable, because when it ceases to be of profit for other purposes, it is good for beef, being readily fattened, and the meat yielded highly nutritious, and of the best flavor.

It has been estimated that a good Ayrshire cow will yield, for two or three months after calving, five gallons of milk daily; for the next three months, three gallons daily; and a gallon and a half for the following three months. This milk is calculated to afford about two hundred and fifty pounds of butter annually, or five hundred pounds of cheese. This estimate is made for cows of the best class, including those large and of first-rate milking capacity, and, what is of prime importance, the best of feed. Even then, the estimate may seem extravagant. The improved Ayrshire cow, of the present day,



THE AYRSHIRE COW.

has the head small, and narrow at the muzzle, though the space between the roots of the horns is considerable. Her horns are small and crooked, her eyes are clear and lively, and her neck is long and slender. The fore-shoulders are thin, and the fore-quarters are generally light. The back is straight, and she is broad behind. The carcase is deep, the udders capacious, and the milk vein large and prominent. The color is varied with mingled white and sandy red.

AZOTE, a gas, which constitutes the most important portion of the air, and is sometimes called nitrogen, because one of the most essential properties of its base is, that in conjunction with oxygen, it composes nitric acid. Though in itself fatal to animal life, it abounds in animal substances, and forms ammonia with their hydrogen when

burned. The great difference between animal and vegetable substances lies in this, the former contains azote, and the latter is destitute of it. Owing to its feeble affinity for other substances, the number of compounds into which azote enters is small, and its influence on agriculture, with the exception of its effect when combined with animal matter, is proportionably limited.

BACON. The flesh of swine that has been subjected to the process of smoking over a wood fire, is termed bacon; but the parts to which this term is most usually applied, and which are usually chosen for bacon, are the hams, the shoulders, and the cheeks. The kinds most celebrated, are the Westphalia, principally brought from Hamburg; the Hampshire, from England; and, in the United States, the Virginia, or southern ham generally. It is not known that there is anything peculiar in the feeding or pickling the Hamburg hams; but their superiority is attributed to the manner in which they are smoked. This is performed in large chambers in the third or fourth stories of buildings, to which the smoke is conducted in tubes from fires of oak or maple chips in the cellars of the buildings. In passing this distance, the vapor which smoke usually holds is deposited, and the hams are perfectly dry and cool during the whole process.

The Hampshire bacon is made from pork not scalded in dressing, but deprived of the hair by quick fires of straw or other combustible materials. This singeing is repeated two or three times, as the case may require, when the hog is cut up, pickled, and carefully smoked. These hams are particularly hard and fine, which is attributed to the skin not having been softened by scalding.

Virginia, or southern hams, are supposed to owe much of their superior flavor to the animals being allowed to run at large the most of the time of feeding, to their being much in the woods, and wild, giving more firmness to the muscles, and to their feeding much on acorns and other products of the forests. Virginia hams are usually small, the hogs themselves rarely weighing over two hundred, and the pickling and smoking is performed in the best manner. The great defects in smoking commonly are, the hams are kept too near the fire, and the condensation of the vapor keeps them wet. Drying while smoking is indispensable to good bacon.

BACON-FOSSIL. A singular fossil was discovered not many years since, bearing this name. Some workmen, in sinking a pole, in a parish of Devon, on arriving at a depth of ten feet from the surface, struck upon a spongy substance of a brown color. They soon found pieces of bone and solid fat of the same hue. At length, the entire body of a hog was extricated, reduced to the color and substance of an Egyptian mummy. The flesh was six inches thick, and the hair upon it very long and elastic. On proceeding in the work, a considerable number of hogs, of various sizes, were found in different positions, in some places two or three together, in others single; the

bodies, when exposed to the air, still retained their consistency, and the stratum continued for twelve feet.

BADGER. A quadruped of the genus *Ursus*, of a clumsy make, with short, thick legs, and long claws on the fore feet. It inhabits the north of Europe and Asia, burrows, is indolent and sleepy, feeds by night on vegetables, and is very fat. Its skin is used for pistol furniture, its flesh makes good bacon, and its hair is used for brushes to soften the shades in painting.

BAG-PIPE. A well known wind instrument, mostly used in rural life. It is of high antiquity among the northern nations, and has long been a favorite with the natives of Scotland. It consists of two principal parts; the first comprises a leather bag, which receives and holds the wind conveyed by a small tube, furnished with a valve, to prevent the wind from returning. The second part of the instrument consists of three pipes; the wind is forced into them by compressing the bag under the arm, while the notes are regulated, as in the flute or hautboy, by stopping and opening the holes, with the ends of the fingers. It is not known when the bag-pipe first made its way into Scotland, but it is probable the Norwegians and Danes first introduced it into the Hebrides. The music is very simple, and yet sweet; and every traveller remembers it with delight.

BAIT. A feed of oats, or any other material given to an animal employed in travelling or labor. It also signifies anything applied with the view of catching an animal; particularly in angling.

BAKING. The art of reducing meal or flour of any kind, or any other substance, into bread. This art, simple and necessary as it may appear, does not seem to have been discovered till a late period in the history of mankind. The earlier nations knew no other use of their meal than to make of it a kind of porridge. Such was the food of the Roman soldiers for several centuries, or at most their skill proceeded no farther than to knead unleavened dough into biscuits or cakes. Even at present there are many countries where the luxury of bread is unknown.

It is said that scarcely any nation lives without bread, or something as a substitute for it. The Laplanders have no corn, but they make bread of their dried fishes, and of the inner rind of the pine, which seems to be used not so much on account of the nourishment to be obtained from it, as for the sake of having a dry food. In Norway they make bread that will keep thirty or forty years, and the inhabitants esteem the old and stale bread in preference to that which is newly made. For their great feasts particular care is taken to have the oldest bread; so that at the christening of a child, for instance, they have usually bread which has been baked perhaps at the birth of the father, or even the grandfather. It is made from barley and oats, and baked between two hollow stones.

A person whose business is that of baking and selling bread, is

called a baker. The origin of this useful profession is not ascertained, though it is certain that the first public bakers appeared in the East, and passed from Greece to Italy, about the year of Rome 583. Prior to that period, every housewife baked her own bread. By the English statutes, no person exercising the mysteries or sciences of baking, brewing, surgery, or writing, shall be deemed a handicraft. Since the year 1155, the first-mentioned artisans have formed a brotherhood in that country; though the white bakers were not incorporated till 1407, and the brown bakers until 1621.

BANIAN TREE. This is one of the greatest wonders of the vegetable kingdom. For many centuries it continually extends itself; for every branch shoots downward, and, striking into the ground, becomes itself a parent tree, whose branches, in like manner spread. One of them, the Cubeer Burr, had 350 stems, equal to large oaks, and more than 3000 smaller ones, covering space sufficient to shelter 7000 persons. Its branches are crowded with families of monkeys, and with birds of every description, and also with enormous bats, all of which find luxurious subsistence on the rich scarlet figs that grow upon it. The common fig-tree, and the sycamore of Scripture, is of the same species, and the wood of the latter is almost imperishable.



BANTAMS.

BANTAMS. An Indian breed of barn-yard fowls so diminutive in size, as rarely to weigh more than a pound; and they have been bred so small as not to be much larger than a lark. Small as they are, they are held in high estimation, both for the beauty of their plumage, and for their utility. The male is a gallant little fellow, of such courage that he will not shrink from measuring his prowess with one of another race, though double of his own size. The hens lay a profusion of eggs, of such excellent quality, that notwithstanding

their inferior dimensions, their effect in pastry, is thought by many, to equal those of the Dorking fowl.

BAOBAB, or BAHOBAB. The name of a huge tree which grows on the west coast of Africa, from the Niger to the kingdom of Benin. The circumference of its trunk is generally between seventy and eighty feet, though the height of the trunk seldom exceeds twelve feet. The branches, which are remarkably thick, shoot out horizontally to the length of fifty or sixty feet, and their extremities, being bent to the ground by their own weight, they form a hemispherical mass of foliage, about one hundred and thirty feet in diameter. The decayed trunks of the Baobab are hollowed out into burying-places by the negroes, for their poets and musicians. The bodies are thus preserved perfectly dry, and resist putrefaction as if they had been embalmed.

BARILLA. A plant, whose salts are used in manufacturing glass. When this plant is grown to its pitch, it is cut down, and let dry; afterwards it is burnt and calcined in pits, like lime kilns, dug in the ground for that purpose; which are closely covered up with earth, so that no air may come at the fire. The matter, by these means, is not reduced into ashes only, but is made into a very hard stone, like rock salt, which must be broken with hammers to get it out.

BARK. In the anatomy of plants, the exterior part of trees, corresponding to the skin of an animal. As animals are furnished with a *panniculus adiposus*, usually replete with fat, which invests and covers all the fleshy parts, and screens them from external cold; so plants are encompassed with a bark replete with fatty juices, by means whereof the cold is kept out, and, in winter time, the spicules of ice prevented from fixing and freezing the juices in the vessel; whence it is, that some sorts of trees remain evergreen the year round, by reason their barks containing more oil, than can be spent and exhaled by the sun. It appears that trees stripped of their bark in the time of their sap, and suffered to die, afford heavier timber, more uniformly dense, stronger, and fitter for service, than if the trees had been cut down in their healthy state.

BARK-BREAD: Is a species of bread which the Laplanders prepare from the inner bark of pine trees. For this purpose the most lofty and clearest branches are selected, the scaly bark taken off, and the succulent white alburnum is collected, dried on coals till it is friable, when it is pulverized, kneaded with water into cakes, baked in an oven, and eaten as bread. In Siberia, when the ermine hunters find their ferment, with which they make their quass, destroyed by the cold, they digest the inner bark of the pine with water over a fire for an hour, mix it with rye meal, bury the dough in the snow, and after twelve hours find the ferment ready prepared in the sediment.

BARLEY. One of the most common cultivated grains, in use from time immemorial, and extensively cultivated in modern times.

It has a thick spike, with long arms attached to the kernel. It is divided into several kinds ; of which the most common are the long-eared, or two-rowed barley, the square or six-rowed, and sprat or battle-door barley. The six-rowed is most commonly cultivated in the north of England and Scotland, having the reputation of being the hardiest plant. In this country the long-eared or two-rowed has usually obtained the preference ; producing a whiter, fairer grain, and smutting less than other kinds. Barley, in this country, is principally used for malting ; in other countries it is extensively used for bread, and for feeding cattle. Barley has met with little favor in this country, as food for horses, but there is nothing improper in the grain, as is evident from the fact, that barley is almost the only grain given to horses in the east, where the best and finest horses are found. The difficulty lies in the mode of feeding. Barley is one of the best substitutes for corn in making pork. It requires a rich soil, rather moist and dry ; and the ground should be made fine before the seed is sown. From two to two and a half bushels of seed per acre, is the usual quantity allowed.

BARM, or YEAST. Used in the composition of bread, to render it light. When the art of brewing became known, this ingredient, which is much better adapted to the purpose than any thing previously used, was discovered. It is the spume which arises on the surface of the beer in fermentation.

BAROMETER. A machine for ascertaining the weight of the atmosphere, in order chiefly to determine the changes of the weather ; hence usually termed a weather-glass. It consists, generally of a glass tube, somewhat more than thirty-one inches in length. It is filled with quicksilver and immersed in a small basin of the same metal, the immersion being so made, that no air can ascend to the upper part of the tube ; hence the small space above the quicksilver is usually a complete vacuum, and hence the ease with which the metal moves up and down in the tube, according as the atmosphere presses upon the quicksilver in the basin. The usual range of the barometer in this country is from twenty-eight to thirty-one inches ; at twenty-eight the air is lightest ; at thirty-one heaviest. Of course when the air is light, the vapors which are suspended in it when it is heavy, must fall to the ground. When high winds blow, the quicksilver is generally low ; it rises higher in cold weather than in warm ; and is also higher at morning and evening than at mid-day. In hard frosts the air is purest and heaviest, the barometer then being at its highest point.

The changes in the height of the column of mercury, preceding or during changes of the weather, have given great value to this instrument, and obtained for it, among common people, the name of *weather-glass*, as foretelling the weather. It is a most valuable instrument at sea ; its rapid fall previous to violent storms, putting the mariner

on his guard, and since its use has been understood, has been the means of saving many valuable vessels and lives annually. It might be of essential service to farmers; but, as yet has not received from them the attention it deserves, as connected with meteorology, a science in which they are so much interested.

BASIN. A term in geology, used to designate a section of country converging to a point lower than the remainder, which part is most usually occupied by lakes, swamps, or rivers. Thus we speak of the basin of the Hudson north of the Highlands, that of the Mohawk above Little Falls, or the basins of Lake Erie and Lake Ontario. The best defined basins of Europe are those of London and Paris. The first of these basins is a bed of clay, in some places 700 feet in thickness. The basin of Paris is formed of chalk, alternating with limestone, marls, and gypsum.

BAZAAR. Among the Turks and Persians, an exchange, market-place, or place where goods are exposed to sale. The word is of Arabic origin. Some bazaars are open, others are covered with lofty ceilings or domes, pierced to give light. At the bazaars, or in the neighborhood of them, are the coffee houses, so much frequented in Turkey, Persia, and other places in the East, and, as the Orientals live almost entirely out of doors, the bazaars of populous cities, besides their mercantile importance, are of consequence as places of social intercourse.

The bazaar of Ispahan is one of the finest places in Persia. That of Tauris is the largest known, and will contain 30,000 men. At Constantinople are two bazaars. In the Oriental tales, for instance, in the Arabian Nights, the bazaars occupy a conspicuous place. Since the system of credit is almost entirely unknown in Eastern trade, and all commercial transactions take place in merchandise and money, the places where this merchandise is brought and changed from one to another are, of course, very much frequented.

BEAN. A vegetable, the seed of which is used for food. Among the ancients, many prohibitions were uttered against them by various teachers. The reasons upon which they were thus interdicted, are not clearly understood by the moderns. The precept of Pythagoras, "Abstain from beans," has been variously interpreted. It is generally supposed to have some hidden meaning. Beans were used in balloting for public offices; and hence some have imagined, that Pythagoras, in reality, charged his disciples not to meddle with the affairs of the state. For whatever reason, beans appear to have been held by several nations in aversion, and even abhorrence. Cicero suggests, that they are unfavorable to tranquility of mind.

BEE, or APIS. A genus of interesting insects. A hive consists of a queen, several hundred drones, and from ten to twenty thousand workers. The body of the queen is considerably larger than that of the others. The government is a regular monarchy, and if there

should be two queens, they fight till one has killed the other. The queen is an object of incessant solicitude and attention to the other bees; she lays eighty thousand eggs in a season; the drones do nothing, but after living three months they are killed by the workers. These collect honey and wax from the nectaria of flowers, bread from the pollen, and resin for their combs.



Queen.



Worker.



Drone.

Bees finish a comb in a short time; it is composed of six-sided cells, arranged in two layers with opposite openings, so constructed as to afford the greatest space with the least material, and the whole is geometrically perfect. It is a wonderful system; and the workers are so much engaged in their own industrious pursuits, that they never attack or sting except when assaulted or endangered. An admirable and very profitable system of preserving them, instead of barbarously suffocating them with sulphur, has lately been introduced, and cannot be too much commended and encouraged.

BEEF. Of all kinds of animal food used, it is believed there is none finer flavored, more easily digested, or more nutritious than beef; certainly there is none more universally used as an article of human sustenance. To have beef in perfection, it is necessary that the animal should be well fed, and, if salted, that the pickle should be carefully made, containing salt enough to harden the lean to the color of mahogany. Dried beef, properly prepared, is an excellent article, and one which should be found among the stores of every farmer. In the tropical regions beef is preserved by being cut, as soon as killed, into thin slices, and thoroughly dried in the sun. Such beef, in the language of the country, is called jerked beef. In some parts of the world, particularly in Abyssinia, beef is eaten raw. At a feast, the animal is tied to the door post, and the flesh is cut from the living beast, being served to the guests, the muscles still quivering with life, and the more distinct this action, the more highly is the flesh esteemed.

BEER. A liquor produced by brewing together malt, hops, and water, and when properly made, is a nourishing and wholesome drink. Beer is, however, like most of the other liquors of commerce and trade, adulterated to a great extent, by the introduction of ingredients of a cheaper nature than malt or hops, if not absolutely poisonous in their effects upon the system. The quantity of beer consumed by the English laborers is incredible, especially during harvest, when

it is provided by the employer. The greater part of the barley grown in this country, as well as in England, is made into beer, though the establishments for the manufacture here are on a small scale, compared with the magnificent and expensive ones of that country. If the good old home-brewed beer, from malt and hops, could be substituted for strong beer, or whiskey and rum, among the classes that consume the most of these drinks, the health and morals of the country would receive a decided improvement.



BERKSHIRE HOG.

BERKSHIRE HOGS. This breed of swine has been generally considered to be one of the best in England, on account of its smallness of bone, early maturity, aptitude to fatten on little food, hardihood, and the females being such good breeders. Those of the pure original breed have been known to attain an immense size, and weigh from eight to ten hundred pounds. One bred at Petworth measured seven feet seven inches from the tip of his snout to the root of his tail, and seven feet ten inches in girth round the centre; five feet round the neck, ten inches round the thinnest part of his hind leg, and two feet across the widest part of his back. He stood three feet nine inches high; and, what was most remarkable in this monstrous hog, he did not consume more than two bushels and six gallons of ground oats, peas, and barley, per week.

BEET. A common vegetable, of which there are several varieties, such as the common beet of our gardens, the mangel wurtzel, or field beet, cultivated for cattle, and the white Siberian beet, grown princi-

pally for the sugar manufacture. The mangel wurtzel is a valuable root, producing heavy crops, and being excellent food for sheep, fattening animals, and for milk cows. It requires a rich loam. The manufacture of sugar from beets, in its most improved state, consists in slicing the roots thin after they are well washed, drying them thoroughly in ovens, grinding them to powder, and then, by putting this powder into water, dissolving the sugar, while the fibre and the mucilage, which rendered the crystallization difficult, remains unchanged, and is separated from the sweet solution by straining. This is then evaporated, and the syrup chrystallized in the usual manner. Beets thus treated yield from eight to ten per cent. For cooking, medium-sized beets are to be preferred, as they are found to be sweeter, and less fibrous than those of larger size. Unlike most other roots, beets are fit for use as soon as they attain a sufficient size; but they do not attain their full perfection till October, and when wanted for winter use, should stand as long as consistent with safety from frost.

BETEL. Is the leaf of a climbing East Indian plant, which belongs to the same tribe as pepper, and, in shape and appearance, is not much unlike ivy, but is more tender and full of juice. There is an almost incredible consumption of betel throughout India, and other parts of the East. The inhabitants chew it almost incessantly, and in such a quantity that their lips become quite red, and their teeth black—a color greatly preferred by them to the whiteness which the Europeans and Americans so much affect. They carry it, in little white boxes, about their persons, and present it to each other, by way of compliment and civility, in the same manner as we do snuff. This is done by the women as well as by the men; and it would be considered an offence, if those, to whom it is offered should refuse to except of and chew it. The leaves are sometimes used alone, but much more commonly when covered with a kind of lime made of sea-shell, and wrapped around slices of the areca nut, the fruit of the areca palm, of the size of a small egg, and resembling a nutmeg deprived of its husk.

BIENNIAL. Any thing that continues or endures two years. This term is usually applied to plants that grow one year and flower the next, after which they perish. They only differ from annuals in requiring a longer period for the maturity of fruit or seed. Most biennials, if sown early in the spring will flourish in the autumn, and then die, thus actually becoming annuals.

BIRD'S NEST. In China and some other countries adjacent to it, the nest of a small swallow is delicately tasted, and is mixed with soups. This nest is found in the rocks; it is of the hemispherical figure, of the size of a goose egg, and in substance resembles isinglass. In the East these nests are esteemed a great luxury, and sell at very high prices.

BISON. A quadruped of the bovine genus, usually, but improp-

erly called the buffalo. The proper buffalo is a distinct species, peculiar to the warmer climates of the Eastern Continent. The bison is a wild animal, with short, black, round horns, with great intervals between their bases. On the shoulders is a large hunch, consisting of a fleshy substance. The head and hunch are covered with a long undulated fleece, of a rust-color, divided into locks. In winter, the whole body is covered in this manner; but, in summer, the hind part of the body is naked, and wrinkled. The tail is about a foot long, naked except a tuft of hairs at the end. The fore parts of the body are very thick and strong; The hind parts slender and weak. These animals inhabit the interior parts of North America, and some of the mountainous parts of Europe and Asia.



BISON.

BISSEXTILE. Every fourth year is called bissextile, or leap-year, in which a day is added to the month of February, on account of the excess of six hours, which the civil year contains, above 365 days. This excess is eleven minutes and three seconds too much; that is, it exceeds the real year, or annual revolution of the earth. Hence, at the end of every century divisible by four, it is necessary to retain the bissextile day, and to suppress it at the end of those centuries which are not divisible by four. Thus 1600 and 2000 are leap-years; but 1700, 1800, and 1900, are common years of 365 days. With this mode of computation it will require a period of nearly 5000 years in order to produce a difference of a single day between the civil and the tropical year.

BITUMENS. Oily matters, of a strong acrid smell, and of different consistencies. Bitumens are combustible, solid, soft, or fluid substances, whose smell is strong, acrid or aromatic. They are found either in the internal part of the earth, or exuding through the clefts of rocks, or floating on the surface of waters. Like oils, they burn with a

rapid flame. Natural historians have divided them into several genera ; but modern chemists arrange them according to their chemical properties, and are only acquainted with six species, which are very distinct from each other : these are, amber, asphaltos, jet, pit coal, ambergris, and petroleum.

BLACK. Something opaque and porous, that imbibes the greatest part of the light that falls on it, reflects little or none, and therefore exhibits no color. Bodies of a black color are found more inflammable, because the rays of light falling on them are not reflected outwards, but enter the body and are often reflected and refracted within it, till they are stifled and lost. Black substances are generally found to be lighter than white, being more porous ; clothes dyed of this color wear out faster than those of any other, from the quantity of vitriol necessary to strike the dye.

BLAST. A disease of plants, to which by different writers has been given the name of blight, blast, and mildew. The latter, however, is evidently a distinct disease, and produced by different causes. Blast or blight has been divided into several varieties, affecting plants in different ways, and with varying intensity. Among these may be mentioned blight originating from cold. The north or easterly winds of spring often produce this, by freezing the tender shoots, or by retarding the flow of the juices. Thus the young fruits are deprived of their nourishment, and fall from the stem. Blast or blight from sultry wet weather, originating contagious diseases of plants, is another of the forms noted, and mildew sometimes seems to result from this cause.

The blight which sometimes strikes the grain of whole districts, would seem to be owing to atmospheric causes thus generated, since the disease appears to follow, and be governed by the course of winds. Blast from the want of nourishment, is another form, but of which the cause is usually obvious. Impoverished land, too great quantities of seed, or injudicious culture, may produce this blight ; but in this country, it is oftener observed as the effect of drought. Blast from *fungi* is the kind of blight which attacks grain also, and which has been erroneously attributed to particular plants, as the barberry bush, since the fungi on the leaves of this plant, and those that cause the blight in wheat, are clearly distinct.

BLASTING OF ROCKS. The process of blasting rocks, or stones, consists in boring a cylindrical hole, about ten or twelve inches deep, in the rock, by means of a chisel for that purpose. The lower part of this hole is filled with gunpowder. The upper part of the hole is then filled up with fragments of stone, firmly rammed together ; a hole being left through these materials, by the insertion of an iron rod, which is turned round during the operation of ramming. This hole is next filled with powder, and a match is applied to it in such a manner, that the operator has time to run out of the reach of the

a manner, that the operator has time to run out of the reach of the fragments of the rock.

This process, which is both tedious and dangerous, is now abandoned for one which is more simple and effectual, and which consists merely in introducing a straw, filled with gunpowder, among the powder at the bottom of the cylindrical hole in the rock, and filling the rest of the cylindrical hole with loose sand. By applying a match to the gunpowder in the straw, an explosion takes place ; and, instead of the loose sand being driven out of the cylindrical hole, as might naturally be expected, the rock is completely shivered in pieces. Mr. Jessop tried the experiment with great success on some of the hard rocks at Fort William, and also on the lime works at Bristol.

BLINDNESS. No animal is so subject to blindness as the horse, and in most cases it can clearly be traced to the treatment they receive. Severe drawing in the harness, or racing, either on the course or otherwise, will not unfrequently produce blindness, sometimes temporary, but often permanent. An examination of the pupils of the eye, will most usually enable an observer to determine whether there is blindness or not. If the pupils, when exposed to light after being in a dark stable, contract, the horse is not blind ; if they contract unequally, or one not at all, then the vision is imperfect, or gone in one of the eyes. The hand placed close over the eye for a few minutes, so as to render the eye dark, will show the dilation or contraction of the pupil, when no other convenient means of excluding light are at hand. A horse, blind with both eyes, will usually have his ears in constant motion, directing them in quick succession to every quarter, relying on hearing rather than sight ; and, he will lift his feet high, as if he were stepping over some obstacle, when there is actually nothing in the way.

BLOOD. The circulating fluid of animal bodies, and by means of which the functions of nutrition and life are carried on. Blood is usually divided into arterial blood, which is that given by the lungs to the heart, and by that thrown into the arteries of the system, and the venous blood, which is returned to the lungs through the veins from the surface and extremities. The venous blood is of a dark purple hue when passed into the lungs, and it leaves them of a rich vermilion color. This change is effected by the absorption, while in the lungs, of oxygen, from the atmospheric air with which they are filled in breathing.

Blood is of much use in some of the manufacturing processes, some valuable coloring pigments being derived from it. From the large quantities of albumen it contains, it is the principal ingredient in freeing sugar or molasses from its impurities, previous to the conversion into lump and loaf sugar. Blood is found to be one of the most powerful manures when applied to the ground, and large quantities of it, mixed with other materials, are obtained from the slaughter-

houses of our principal cities, and appropriated to this purpose. When animals are attacked with fever, one of the surest remedies is bleeding, either local or general, as the cause may demand.

In a fluid of such importance as the blood, it will readily be inferred that many material changes are constantly going on, both of a physical and chemical kind, so as to modify constitutional temperaments, regulate the condition of health, and influence morbid affections; these changes, however, have not hitherto been ascertained with anything like a precision sufficient to authorize inferences as to the connection of such and such variations with such and such maladies. Indeed the seemingly innoxious nature of the blood, while the frame is under the influence of the most noxious poisons, is a striking fact in the animal economy. It has, for example, been ascertained that the flesh and the blood of an animal that is laboring under hydrophobia, and which animal, by its saliva, is capable of innoculating another with the specific disease, may be eaten with impunity.

Again, puncture the veins of an individual who is the subject of small-pox, take blood from that subject, and mix it with the blood of another, you will not by this process impart the sickness; an impartation which every one knows to be effected with facility by a very minute portion of the matter taken from the pustules that characterize the disorder.

BLOSSOM. The opening of flowers in general. It is a term applicable to every species of tree or plant, and more frequently used than flower or bloom, when we have reference to the fruit which is to succeed. Thus, we say *flowers*, when we speak of shrubs cultivated for ornament; and we say *bloom*, in a more general sense in reference to the beauty of flowers.

BLUBBER. Is the fat of whales, and other large sea animals, whereof train oil is made. It is properly the adeps of the animal; it lies immediately under the skin, and over the muscular flesh. In the porpoise, it is firm and full of fibres, and invests the body about an inch thick. The whole quantity yielded by one of those animals ordinarily amounts to forty or fifty, sometimes eighty hundred weight, or even more.

BOA. The negro name of a great tree that grows in some of the parched districts of Africa, and in a wonderful manner furnishes supplies of water. The trunk of this tree, which is of a prodigious bulk, is naturally hollow like a cistern. In the rainy season it receives its fill of water, which continues fresh and cool in the greatest heats, by means of the tufted foliage which crowns its summit. Another manner in which Providence has contrived a supply for the thirst of man, in sultry places, is no less worthy of admiration. Nature has placed amidst the burning sands of Africa, a plant, whose leaf, twisted round like a cruet, is always filled with the quantity of a large glass full of

fresh water: the gullet of this cruet is shut by the extremity of the leaf itself, so as to prevent the water from evaporating.

BOG. A swampy piece of ground, usually containing large quantities of vegetable matter, frequently of the nature of a quagmire, and with tufts of coarse grass mingled with aquatic plants spread over its surface, is in Europe, and also in this country, termed a bog. Such pieces of amphibious soil are not common in the United States, but in Scotland and Ireland, a very considerable portion of the surface is occupied by such non-productive lands. Where bogs exist, the only modes of bringing them under culture, are, by draining or covering the surface with firm earth, and frequently it is necessary to combine both operations. Draining the land consolidates the surface, and affords opportunity to cut off the bogs or coarse tufts of grass, and introduce more valuable grasses, if not to submit it to the action of the plough. Where the boggy ground is mostly composed of vegetable matter, it is desirable to incorporate the common earths with the surface, thus giving increased powers of production and greater firmness. Gravel or sand may be carried on when the ground is frozen, if the surface is not hard enough at other times, and by thus uniting draining and the application of earths to impart consistency, such soils, worthless in their natural state, are rendered most valuable and productive.

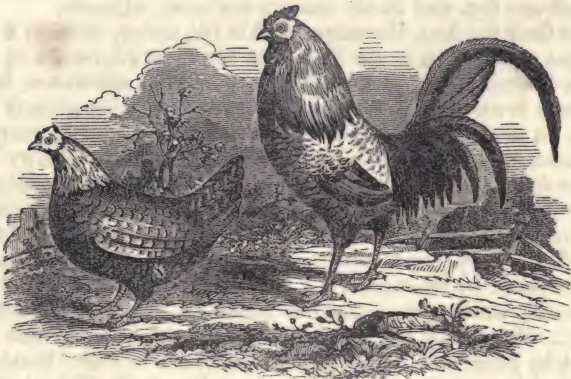
BOILING, or EBULITION. The bubbling up of any fluid. The term is most commonly applied to that bubbling which happens by the application of fire, though that which ensues on the mixture of an acid and alkali is sometimes also distinguished by the same name. Boiling, in general, is occasioned by the discharge of an elastic fluid through that which is said to boil; and the appearance is the same, whether it is common air, fixed air, or steam that makes its way through the fluid. The boiling of water is proved by Dr. Hamilton, of Dublin, in his Essay on the Ascent of Vapor, to be occasioned by the lowermost particles of the water being heated and rarefied into vapor by reason of the vicinity of the bottom of the containing vessel; in consequence of which, being greatly inferior in specific gravity to the surrounding fluid, they ascend with great velocity, and lacerating and pushing up the body of water in their ascent, give it the tumultuous motion called boiling.

The degree of heat at which different fluids boil, is very different. Spirits boil at the lowest temperature, pure water next; at a still higher temperature, the fixed oils. The degree of heat at which a fluid boils, is called its boiling point. This is used as one of the fixed points in the graduation of thermometers. Ether may be made to boil at the common temperature, by merely exhausting the air from the vessel in which it is contained.

BOLTON GREY HENS. One of the varieties of the Hamburg fowls is known by this name. The breed is much esteemed. It is handsome, active, and valuable for eggs as well as the richness of its

meat. It is known in various parts of England, sometimes under other names—to wit, the Coral, the Creole, and the Pencilled Dutch. In some sections of that country it is more highly esteemed than any other fowl. In Pennsylvania it is called the Creole, and is much admired. Where a small number only is kept for family use, the breed has been thought preferable to all others. The weight rarely exceeds six pounds a pair, but when fat, the deficiency of weight is more than made up by the tender and nutritious qualities of the flesh. The comb is generally double or rose comb, though single combs sometimes are shown by the thorough-bred fowls. The legs and feet are of a light blue or leaden color. Their ground color is a silver white, that is marked with black or dark blue, in several parts of the body. The tail in both sexes is darker than the body, and by its form adds much to the beauty of the bird.

The best specimens of Bolton Greys are noted for their fecundity. Some hens will lay daily, for several months in succession, without evincing any desire to sit; but they are not all so prolific. They vary in this respect just as cows of a particular breed vary in their milking qualities, or the members of a family in their dispositions and habits. The general character of the variety may be good, but it has numerous exceptions. Taken altogether, however, we do not know of any fowl which is more likely to give satisfaction to the common breeder—attractive in its appearance, and, perhaps, as profitable as any.



BOLTON GREY HENS.

BONE. The frame-work of animals, constituting the skeleton, is called bone, and is composed of several ingredients, the principal one of which is the earth called the phosphate of lime. This material

appears to have been selected for this purpose, as forming much harder compounds with animal membrane than the carbonate, which is used in the composition of shells. The harder and more solid the bone, the greater the proportion of the phosphate: thus the bony portions of the ear are very hard, and they consist almost wholly of the phosphate. The long part of the teeth contains considerable carbonate, but the enamel, or cutting parts, which sometimes approaches to the hardness of steel, is nearly pure phosphate. The composition of bone can be determined by fire, or more accurately by acids; and they are found to consist of phosphate of lime, a small quantity of carbonate lime, the whole cemented together by a strong, elastic animal membrane, to which is added oil, of which the principal depository is the interior of the bone.

The use of bone dust, or bones reduced to powder by grinding, has introduced a new era in agriculture in some parts of the world. Crushed bones were first extensively introduced as a manure in the counties of Lincoln and York about the beginning of the present century, and they are now considered the best and most efficacious application that can be made to the soil. It has been estimated that by extending the growth of the turnip crop to districts where it was not before grown, and thus increasing the means of raising cattle and sheep, and through these, indirectly, the culture of wheat and barley, the means of subsistence in England has been increased one-fifth. The experience of farmers who have used this manure, shows that it succeeds best on light, dry, calcareous loams, or in general on any soils that are dry, and do not contain too much alumine.

The finer the dust, the more rapid is the action, while as a matter of course, that which is not so fine, is the most durable in its effects. Twelve bushels per acre drilled in, is the usual allowance, but it is sometimes sown broadcast, and the quantity varied from ten to twenty bushels an acre. Where lands are much impoverished, thirty bushels an acre have been used with success. In our own country the use of bone dust, as a manure, is annually increasing, especially in the neighborhood of large cities, where bones are easily collected, and where mills for reducing them to powder have been constructed.

BOTS. A species of small worms found in the intestines of the horse, is called by this name. A fly deposits its eggs on the knees of the animal, which are sometimes bitten off, and then carried to the stomach, where they are hatched. The young bots adhere to the stomach by little hooks, and are nourished by the mucus of the stomach, or the food it contains, until the next spring, or the first of the summer, when, having attained full size in the larvæ state, they drop their hold, and are usually carried along with the contents of the stomach, and are voided. They then burrow in the ground, and remain a few weeks in the chrysalis state, when they undergo a more important transformation, and become flies, or perfect insects, pursuing the course

of their predecessors. This is the course that nature has provided for their propagation; and some contend that bots never injure a horse, but are beneficial. Others think that very rarely they injure him.

BOTANY. This is the branch of natural history which treats of vegetables, of the different plants, and of the distinguishing marks by which each individual species may be known from every other. Or, botany is the science of the structure, functions, properties, habits, and management of plants, and of the technical characters by which they are distinguished. The study of this science is not a trifling employment, undeserving the time and attention bestowed upon it. Our food, our medicine, our luxuries are improved by it. By the inquiries of the curious new acquisitions are made in remote countries, and our resources of various kinds are augmented. We find that gardening, the most elegant, and agriculture, the most useful of all arts, are improved only in those countries in which botany is made subservient to their advancement. And as knowledge of this science is more generally diffused throughout our country, we may expect to see it more frequently enriched with fields, and adorned with gardens, which, while they bestow honor on their possessors, shall prove a pleasant recreation to the old, and a useful study to the young.

BOTTLE. A name given to certain small vessels, differing in size and form, and composed of different materials. We find them square, circular, and cylindrical; some with short, and others with long necks. We have bottles of wood, stone, glass, and leather; all of them used either for ripening or preserving liquors. Common bottles are made of a coarse, green-colored glass. When a finer sort is employed, and the exterior of the vessel has been wrapped about with straw or wicket, it gets the name of *flask*. By this covering, it is rendered less brittle, and is much used by travellers. Glass bottles were unknown to the ancients, at least the knowledge of them has not been traced to a period earlier than the fifteenth century.

The country people of Persia never go a journey without carrying by their side a small leathern bottle, in which to keep their water. The Spaniards still use them under the name of *Borrachas*. They are convenient, likewise, as the best means of preserving other substances, such as butter, cheese, and honey. The manner of preparing them is thus described by Chardin: "When the animal is killed, they cut off its feet and its head, and draw it in this manner out of the skin, without opening its body. They afterwards sew up the places where the legs were cut off, and the tail, and when it is filled they tie it about the neck." It is certain that bottles of skin were universally employed as wine vessels among the ancient Jews. And we may here notice the Abyssinian *Girba*, though it does not properly rank under the term *bottle*. It is made of an ox's skin, squared and stitched together so closely as to be water tight, and will contain about sixty gallons.

BOW. A well known offensive weapon, which has been used in war and hunting from times of the most remote antiquity. Although the invention of the bow is, at first sight, extremely obvious and simple, yet the application of a missile body along with it, renders the use of it more complicated. Hence the rudest class of savages are entirely unacquainted with its properties, though they possess weapons apparently of more difficult construction.

The form and substance of the bow have been greatly diversified in different countries ; wood, horn, and steel, have all been successively adopted ; but the first, from convenience, is in most general estimation. In Tartary, Persia, and other eastern regions, bows are manufactured from the horns of the antelope, and beautifully ornamented. They are sometimes composed of wood and horn, two pieces of equal length being applied parallel to each other, bound together by catgut, and then covered with the smooth bark of a tree, which receives suitable decorations, and a coat of varnish. The Laplanders are said to frame their bows of two flat pieces of birch and fir glued together ; and in England the modern bows are constructed of yew or cocoa wood, with a slip of ash, or some other elastic wood glued on the back.

BOX TREE. The box tree is a shrubby evergreen tree, twelve or fifteen feet high, which has small, oval, and opposite leaves, and grows wild in several parts of Britain. It has been remarked, that this tree was formerly so common in some parts of England, as to have given name to several places, particularly to Box-hill, in Surrey, and Boxley, in Kent ; and in 1815, there were cut down at Box-hill as many trees of this sort as produced upwards of fifty thousand dollars. This tree was much admired by the ancient Romans, and has been cultivated, in later times, on account of its being easily moulded into the forms of animals and other fantastic shapes. The wood is of a yellowish color, close grained, very hard and heavy, and admits of a beautiful polish. On these accounts it is much used by turners, by engravers on wood, carvers, and mathematical instrument makers. Flutes and other wind instruments are formed of it ; and furniture, made of box-wood, would be valuable were it not too heavy, as it would not only be very beautiful, but its bitter quality would secure it from the attacks of insects. In France, it is in much demand for combs, knife-handles, and button-moulds ; and it has been stated that the quantity annually sent from Spain to Paris is alone estimated at more than ten thousand livres. An oil distilled from the shavings of box-wood has been found to relieve the toothache, and to be useful in other complaints ; and the powdered leaves destroy worms.

BRAIN. The soft substance within the skull. It has been thought probable that the soul is seated in the fluid of the ventricles of the brain. This opinion is drawn from the fact that the organs of vision, hearing, taste, and smell are all at their origin in contact with, and

exposed to the action of this fluid ; from the same taking place in regard to the nerves of touch, and those belonging to the organs of the voice, and the motions of the eyes ; from the impossibility of finding a solid part of the brain into which the terminations of all the nerves can be traced ; from the nerves of the finest senses, viz : hearing and seeing being most extensively expanded, and most directly in contact with this fluid ; from the preternatural increase of it in the ventricles of rickety children, which may, perhaps, be the cause of their uncommon acuteness of mind ; and, finally, from the fact that no animal possesses so capacious and so perfectly organized ventricles as man ; they being in the other mammalia much smaller than in him, still less in birds, least of all in fishes, and absolutely wanting in insects.

BREAD. In the earliest antiquity, we find the flour or meal of grain used as food. The inconvenience attending the use of the grain in its natural state, and, perhaps, the accidental observation, that when bruised, and softened in water, it formed a paste, and when dried again a more compact, mealy substance, led, by degrees, to the artificial preparation of bread. Easy as it seems to us, it must have been a long time before it was completely successful.

The grain was first bruised between two stones, and, from the meal mixed with milk and water, a dry, tough, and indigestible paste was made into balls. This is yet the chief food of Northern Africa. The Carthagenians, also, eat no bread, and hence were called, in derision, by the Romans, *multiphagi*, that is, pottage eaters.

The best and most wholesome bread is made in the United States and in France. In England, the flour is adulterated with too many foreign substances, in order to make the bread whiter. In some parts of Sweden, the bread is composed, in part, of the bark of trees in winter. In Westphalia, a kind of very coarse, black bread is made, of which the peasants bake one large loaf for the whole week. This is divided for use with small saws. In many parts of Germany, bread is made of grain nearly entire, or but just bruised, which is very coarse, and frequently forms part of the food of horses. Bread is found wherever civilization has extended. The want of bread has often occasioned public commotions, particularly in Paris and ancient Rome.

BREAD FRUIT. The fruit of the *arto-carpus*, or bread-fruit, appears to have been first discovered to Europeans by the great navigator Dampier. It is indigenous in the islands of the South Sea. The tree is said to be of the size of a large apple tree ; the leaves broad, and of a dark green. The fruit is appended to the boughs in the manner of apples, and of about the size of a pound of bread, inclosed in a tough rind, which, when ripe, turns of a yellow color. The internal part is yellow, soft, and sweet. The natives of the countries where it grows, bake it in an oven till the rind is black ; and this being scraped off, they eat the inside, which is then white,

resembling newly baked bread, having neither seed nor stone. If kept in this state twenty-four hours, it grows harsh. It is said to be very satisfying to the stomach, full of nourishment, and therefore, proper for hard working people. It is known at Bantam, by the name of *foccum*; and Anson calls the tree *rima*. It supplies food during three-fourths of the year.



BREAD FRUIT.

BREECHES. An article of clothing in use even among the Babylonians, and which, with them, were made so as to cover the foot, and supply the place of stockings. In Europe, we find hose first used among the Gauls. In the fifth century, they had become fashionable in Rome; but the breeches-makers were expelled from the city by an imperial edict, it being considered unworthy of the lords of the world to wear these barbarous investments. The stockings were separated from them some centuries since. Sometimes they were worn small, and sometimes large, as the fashion changed. In some instances, an immense quantity of cloth was put into them. The poor stuffed theirs out with such substances as they could procure. Joachim II., Elector of Brandenburg, who had forbidden the wearing of these enormous integuments, made a person, whom he saw with a pair, rip them open, when some bushels of bran fell out of them.

Osiander and Musculus raised their voices against this preposterous fashion. The modern breeches were first introduced during the reign of Louis XIV.

BREEDING. A term applied to the improvement of animals by crosses, or breeding from new varieties, by which new and superior kinds are obtained, and any desirable quality, whether of size, propensity to fatten, or for milk, secured. It is only within the last half century, that the business of breeding has received the attention it deserves; and the astonishing improvement made in the animals of those countries where it is best understood and practiced, shows that

few steps in reducing agriculture to a science, have been attended with happier consequences. Such has been the result in England and Scotland, that the average individual weight of the immense numbers of cattle and sheep now annually slaughtered at Smithfield, is nearly or quite one-half greater than it was at the time the first efforts at improvement by breeding commenced. Of the many who distinguished themselves in Great Britain, as breeders, Bakewell and Collings, Culley and Berry, are noted for cattle, and Bakewell and Ellman have distinguished themselves in the improvement of sheep.

The principles of breeding are few and simple. Let the objects desired in any particular race of animals be distinctly understood, and the animals for breeding or crossing be selected with reference to these objects. It should be remembered, that in determining the character of the offspring, it is found by experience, that the influence of the male is greater than that of the female. It is by the observance of these, and a few other principles equally plain and simple, that Bakewell and Collings raised the Durham short horns to so high a standard; that the first named gave to the Leicester sheep a form and weight of which former sheep growers had never dreamed; that Ellman has brought the Southdown to within a few grades of the Merino in fineness of wool; and that the improved varieties of swine, such as the Chinese, Berkshire, and others, have so far exceeded in value and actual profit to the farmer, the common kinds of this animal. Great efforts are at this time making in this country, and with decided success, to raise the standard of our domestic animals, by importations from abroad, and careful breeding at home. The results are such as to encourage the belief, that in a few years first rate animals of all kinds will be as common here as they have hitherto and most unfortunately been rare.

BREWING. The art of brewing, or of preparing a vinous fermented liquor from the farinaceous seeds, is of high antiquity. The ancient Egyptians, from the soil and climate of their country not being favorable to the culture of the vine, were induced to seek a substitute in barley, from which, in all probability, by the process of malting, they knew how to procure a fermented liquor. The town of Pelusium, situated on one of the mouths of the Nile, was particularly celebrated for its manufactures of malt liquor, of which there were two kinds; one called *Carmi*, was sweet, and appears to have resembled our sweet and glutinous ales; the other named *Zithum*, seems to have been analagous to modern beer. The Germans, from the testimony of Tacitus, were capable of preparing a liquor similar to wine from barley, by fermentation. Julian, Strabo, and Polybius, show, that the same art was known to the Spaniards, the Gauls, and the inhabitants of the British islands, and the north of Europe. All the ancient malt liquors, however, seem to have been made entirely of barley, or some other farinaceous grain, and therefore were not gene-

rally calculated for long keeping, as this quality depends considerably, though not entirely, on the bitter extract of hops, or other vegetables, with which the liquor is mingled.

BRICK. A kind of factitious stone, made of argillaceous earth, formed in moulds, and baked in kilns, or dried in the sun. Bricks appear to be of the highest antiquity; and, as we learn from sacred history, the making of them was one of the oppressions to which the children of Israel were subjected during their servitude in Egypt. The bricks of the ancients, however, so far differed from ours, that they were mixed with chopped straw in order to bind the clay together, and instead of being burned were commonly dried in the sun. Vitruvius recommended, that they should be exposed in the air for two years before they were used, as they could not be sufficiently dry in less time; and by the laws of Utica, no bricks were allowed to be used, unless they had lain to dry for five years. From Dr. Pocock's description of a pyramid in Egypt, constructed of unburnt bricks, it appears that the Egyptian bricks were nearly of the same shape as our common bricks, but rather larger. The bricks used by the Romans were in general square; and M. Quatremere de Quincy observes, that in his researches among the antique buildings of Rome, he found them of three different sizes.

Among the celebrated buildings of antiquity, constructed of brick, were the tower of Babel, and the famous walls of Babylon, reckoned by the Greeks among the wonders of the world; the walls of Athens, the house of Cræsus at Sardis, and the walls of the tomb of Mausolus. The paintings, which were brought from Lacedæmon to Rome, to ornament the Comitium in the edileship of Varro and Murena, were cut from walls of brick; and the Temple of Peace, the Pantheon, and all the Thermæ, were composed of this material. The Babylonian bricks, which are in the possession of the English East India Company, and upon which Dr. Hayes favored the public with a dissertation, are inscribed with various figures and characters, and are supposed by some to be a part of that brick work, upon which Pliny tells us that the Babylonians wrote the observations which they made of the stars for seven hundred and twenty years.

BRIDGE. In *Architecture*, from a Saxon word, is a structure of carpentry, masonry, or iron work, built over a river, canal, or valley, for the convenience of passing from one side to the other, and may be considered as a road supported in the air by arches or lintels, and these again supported by proper piers or buttments. A stately bridge over a large and rapid river, while it is one of the most difficult, is justly esteemed one of the most noble and striking specimens of human art. To behold grand arches composed of an immense quantity of small materials, so disposed and united as to form one compacted body, which, bestriding the stream, affords above an ample communication with the distant shores, and allows below an uninter-

rupted passage to navigation, is enough to awaken the admiration of every spectator.

One of the most celebrated of the bridges of antiquity was that built by Trajan over the Danube. It was erected by that emperor for the conveniency of sending succors to the Roman legions on the other side of the Danube, in case they should be suddenly attacked by the Daci, but demolished by his successor, Adrian, lest the barbarians, overpowering the guards set to defend the bridge, should, by means of it, pour into Maesia and cut off the garrisons there.

The celebrated Roman bridge, near Lyons, has long been reckoned one of the finest and boldest of the ancient bridges in France. Its whole length is upwards of eight hundred yards; it is very crooked, bending in many places, and making several unequal angles, especially in those parts where the Rhone has the strongest current. The arches are from fifteen to twenty fathoms wide, and have their feet, or the bottoms of the piers, protected by two pedestals which project from them; the lower part of the piers consists of several courses of footings jutting out like steps. Between the great arches there are smaller arches like windows that come down nearly to the top of the pedestals, about the middle of the pier. This mode of construction was adopted with a view of breaking gradually the mighty force of the Rhone, the several courses of steps jutting out from the piers were intended to oppose and break the stream by portions, and prevent it from coming with its full force at once upon the fabric; and when the flood should rise so high as to cover the steps and pedestals, then the small window-like arches would assist to convey the water through, which might otherwise endanger the great arches.

Iron being the most abundant, cheap, and generally useful of all metals, has of late been employed in many works where great strength was required in proportion to the weight of the material; hence cylinders, beams, and pumps for steam engines, boats, and barges for canals and navigable rivers, beams and pillars for warehouses and other large buildings, and at length bridges, have been constructed of iron. Iron bridges are the invention of British artists.

BRIDLE. The head-stall, bit and reins by which a horse is governed. The origin of it is of high antiquity. The first horsemen guided their horses with a little stick, and the sound of their voice. A cord drawn through the nose is sometimes used for other animals. The ancient Thessalonian coins often represent a horse with a long rein trailing on the ground. The Romans were trained to fight without bridles, as an exercise in the manege. On Trajan's column, soldiers are thus represented at full speed. The parts of a modern bridle are the snaffle or bit; the fillet, over the forehead, and under the foretop; the throat band, which buttons under the throat; the reins; the nose band, buckled under the cheeks; the trench, the cavesson, the martingal, and the chaff halter.

BRISTLES. The strong glossy hairs growing upon the back of the wild boar and the hog. They are an important item in the matters furnished by swine. They are used by the brushmaker and the shoemaker, and they form an article of commerce much more in value than one would at first imagine. Large quantities are annually imported into England, mostly it is believed from Russia and Prussia. M'Culloch says, that the quantity amounted to 1,789,801 pounds a year, for the three years ending 1831. Youatt supposes that each hog furnishes one pound. If this estimate is correct it would be easy to calculate the probable value of all the bristles yielded in the United States. Professor Low says that in the Orkney Islands ropes are made from bristles, for some purposes preferable to those manufactured from hemp.

BROADCAST. In sowing broadcast considerable skill is requisite to spread the seed equally over the ground. A failure of this kind is not only injurious to the crop, but as when the grain springs up, it may be seen for a great distance, the unevenness of the sowing gives a most unfarmerlike aspect to the field. In broadcast sowing advantage should be taken of the wind, otherwise, great inequalities will sometimes be produced. When grain is sown broadcast, the plough or the harrow is to be used for covering it; and unless these operations are well performed, much of the seed will remain uncovered, and be lost to the purposes of vegetation. More seed is required to the acre when sown broadcast than when put in drills. Machines have been invented for sowing seed broadcast, which do the work with great precision; and, where the ground is even and free from stones, they answer an admirable purpose.

BROCCOLI. This is an improved variety of cabbage, the flower buds of which are to be eaten. It differs from the cauliflower only in the looseness of the inflorescence. The varieties are numerous, the early white and the white cape being the best; but the purple cape is the only kind much cultivated. In flavor, good judges pronounce the flowers equal to the cauliflower; and, as its cultivation is much more easy, its use will become much more general, especially in the country, where the conveniences for raising the other are less common. It is not a long period since it was first known to American horticulturists; and, it is only about a quarter of a century since its proper mode of culture was correctly understood by them.

In the middle and northern portions of our country the seeds may be sown towards the end of May. The transplanting may be made in July, or when the plants are large enough, into very rich, manured, and mellow earth. They should be from eighteen to twenty-four inches apart, each way. The flowers will probably begin to show themselves in the latter part of August. In September more will show themselves; and from the middle of the month to the middle of November, they produce one continued succession of flowers. The

degree of frost they will be able to withstand without sustaining the least injury, when they are in their highest state of flowering, is astonishing ; and, the most singular and invaluable characteristic of this plant is the great length of time which is contained between their first beginning to flower and their final termination ; and that, too, all from the same seed, sown at the same time, and the plants all treated precisely in the same manner.

BROKEN WINDED. This is disease of horses, in which the inspiration is performed by one effort, and the expiration by two ; which is plainly distinguished by observing the flanks, and noticing that the expiration occupies double the time of the inspiration. The cause is, the rupture or running together of some of the air cells in the lungs, and the consequence is, that while the expansion of the chest fills the lungs with air, an unusual and double effort is required to force it out of the unnatural position it occupies. In healthy lungs, when they are expanded, the air will rush in easily enough, and one effort of the muscles of expiration is sufficient for the purpose of expelling it ; but, when the cells have run into each other, the cavity is so irregular, and contains so many corners and blind pouches, that it is exceedingly difficult to force it out again, and two efforts are scarcely competent fully to effect it. A dry, husky cough of a peculiar kind, attends this disease.

The origin of the disease is to be found most commonly in the previous treatment of the animal ; although it is sometimes the result of inflammation of the lungs. Horses which are fed on bulky food, which are allowed but a short time to eat, or are naturally great feeders, and which are put to severe work on a full stomach, are the horses that most commonly are broken winded. Hence farmers' horses suffer the most, as the food they receive is generally more bulky, and the time allowed for receiving and digesting it is less than with others, which are fed mostly on grain and are allowed longer seasons for rest. It is not pretended that this disease can be cured, yet much may be done in the way of palliation. The food should consist of much nutriment in little compass ; the oats should be increased, and the hay diminished ; occasional mashes will be found useful ; water should be given sparingly except at night ; and the horse should never be exercised on a full stomach.

BRUSH. An instrument for cleaning anything of dust and dirt, by light rubbing, as floors, furniture, clothes, boots, or merchandise. The process is too frequent to require description. Brushes were originally made of shrubs or small branches of trees tied together, and such are yet used for coarse purposes. But the materials most used are bristles set in wood. Painters use brushes of bristles in their work. Silversmiths use a wire brush for scrubbing metals in order to gilding ; and there is a method of staining leather by rubbing the color on the skin with a brush.

BRUTE. A general name for all animals except mankind. Philosophers have been puzzled about the essential characteristics of brutes, by which they may be distinguished from man. There is a very ingenious treatise in German, published by the late Professor Bergman, entitled, "Researches designed to show what the Brute Animals certainly *are not*, and also what they probably *are*." That they are *not* machines, he proves with more detail than seems necessary for refuting an hypothesis which would equally tend to make *us all machines*. It is certain, that the *half reasoning* elephant cannot be deemed a machine by us, from any other consideration than that *he* goes upon four feet, while *we* go upon two; and he might as well take us for mere machines, because *we* go upon two feet, while *he* goes upon four. But if animals are not mere machines, what *are* they? Manifestly, sensitive beings, with an immaterial principle; and thinking or reasoning beings, to a *certain degree*.

In certain classes of animals, this appears evident to Sir T. Bergman, who seems to have observed, with great sagacity and attention, their *various* operations, their ways and means. He thinks it impossible to deduce this in any animals, (if we except those of the lowest classes in the gradation of intelligence,) from a general and uniform instinct; for they accommodate their operations to times and circumstances. They combine; they choose their favorable moment, and receive instruction by experience. Many of their operations announce reflection; the bird repairs a shattered nest, instead of constructing instinctively a new one; the hen who has been robbed of her eggs, changes her place, in order to lay the remainder with more security; the cat discovers both care and artifice in concealing her kittens. Again, it is evident that, on many occasions, animals know their faults and mistakes, and correct them; they sometimes contrive the most ingenious methods of obtaining their ends, and, when one method fails, have recourse to another; and they have, without doubt, a kind of language for the mutual communication of their ideas.

How is all this to be accounted for, (says Bergman,) unless we suppose them endowed with the powers of perceiving, thinking, remembering, comparing, and judging? They have these powers, indeed, in a degree inferior to that in which they are possessed by the human species, and form classes below them in the scale of intelligent beings. But still it seems unreasonable to exclude them from the place which the principles of sound philosophy, and facts ascertained by constant observation, assign to them in the great and diversified sphere of life, sensation, and intelligence. He does not, however, consider them as beings whose actions are directed to *moral* ends; nor, consequently, as accountable and proper subjects for *reward* or *punishment* in a future world. That brutes possess reflection and sentiments, and are susceptible of the kindly, as well as the irascible passions, independently of sexual attachment and natural affection, is evident from the

numerous instances of gratitude daily observable in different animals, particularly the dog. Of those and other sentiments, such as pride, and even a sense of glory, the elephant exhibits proofs equally surprising and indubitable.

BUCKWHEAT. This plant is grown in almost every part of the world. In China, Japan, and Russia it forms a very large portion of the food of the inhabitants. It is likewise eaten in Switzerland, and the southern parts of France, and in Flanders it forms an important branch of industry. It has been known in Europe at least from the time of the crusades. Gerard speaks of it as cultivated in England about the year 1597. It was brought into Europe from the northern part of Asia. The common buckwheat bears white flowers, tinged with red. Its stem is full of knots, and rises to the height of two feet or more. It is said that twenty branches or stems will sometimes rise from a single seed. The flowers are in bunches, at the ends of the branches, and are succeeded by black, angular seeds.

Buckwheat thrives well in almost any kind of soil, even those of the poorest description. In most arable districts, it is sown on the inferior sorts of land, as, when cultivated on the richer kinds of soil, it is found to run too much to straw. Of course, the lighter soils are adapted to it. On this account it is extensively cultivated. Besides, the labor in its culture is trifling. And what is not less material, the period in completing its growth is very short. If sown in mid-summer, it usually has full time for attaining maturity. It is most susceptible to cold, and the slightest hoar-frost will destroy it. The product of buckwheat in the United States, for 1847, has been estimated at twelve millions of bushels, or a little less, and more than half of the amount was raised in the States of New York and Pennsylvania. It is said that in Ohio the kernels have grown far larger than elsewhere known, and that the product upon the acre has been proportionably larger.

BUD. The germ or first fruit of a plant, which is the organized rudiment of a branch or flower. Buds proceed from the extremities of the young shoots, and also along the branches, sometimes single, sometimes two and two, either opposite or alternate, and sometimes collected in greater numbers. In general, buds are of three kinds, that containing the flower, that containing the leaves, and that containing both flower and leaves. The bud is covered with a kind of scales, which are intended to defend the enclosed rudiments from cold and other external injuries. These scales are closely applied to each other; those on the outside are the longest and the thickest, and those in the interior are smaller and more delicate. In cold countries, the external scales are often covered with hair, or a resinous varnish, or some other contrivance, which enables them to prevent the access of frost to the young and tender centre which they protect; but in warm countries, where such a provision is not required, they are green and

smooth, and much less numerous. The cellular centre of a bud is the seat of its vitality ; the scales that cover it are the parts towards the development of which its vital energies are first directed. Fruit buds, in most cases, are distinguishable from the wood buds by their rounder and fuller form, the scales that cover them are broader and less numerous, and in the spring they begin to swell and show signs of opening at an earlier period.

BUDDING. This is a method of propagation practiced for various sorts of trees, but particularly those of the fruit kinds. It is the only method which can be had recourse to with certainty for continuing and multiplying the approved varieties of many sorts of fruits and other trees, as, although their seed readily grow, and become trees, not one out of a hundred, so raised, produces anything like the original, and but very few that are good. But trees or stocks raised in this manner, or being budded with the proper sorts, the buds produce invariably the same kind of tree, fruit, and flower, continuing unalterably the same afterwards. The object in view in budding is almost always that of grafting, and depends on the same principle, all the difference between a bud and a scion being, that a bud is a shoot or scion in embryo ; in other respects, budding is conducted on the same principles as grafting. In every case, the bud and the stock must be botanically related. An apple may be budded on a pear or thorn, but not upon a plum or peach. Common budding is performed from the beginning of July to the middle of August.

BUFFALO. If we should compare the common cow with the bison, the difference between them will doubtless appear great ; but when we draw a resemblance between that and the buffalo, no two animals can be nearer alike. Both are equally submissive to the yoke, and both are employed in the same domestic scene ; notwithstanding which, they have such an aversion to each other, that were there but one of each kind, there would be an end of the race. The buffalo, upon the whole, is by no means so beautiful as the animal which it is like ; his figure is more clumsy and awkward, and he carries his head nearer the ground ; his limbs are not so well covered with flesh, and his tail is much more naked of hair ; his body is shorter and thicker than the cow, and his legs are longer in proportion to his size ; his head is smaller, his horns not so round, and his skin is not near so well covered with hair ; his flesh is hard and disagreeable to the taste, and has a very strong and disagreeable smell ; the milk of the females is much inferior to the cow's, but in warm countries it is used for butter and cheese.

The veal of the young buffalo is equally unpalatable with the beef which is produced from the old, and the most valuable part of the whole animal is generally allowed to be the hide, the leather of which is famous for impenetrability and for the softness and smoothness of the wear. The chief use of these animals is for drawing immense

burdens and weights; they are guided by a ring thrust through their nose, and then yoked to a wagon in pairs; and their strength is allowed so superior to a horse, that two buffaloes will draw as much as two pair.

The wild buffalo, which inhabit many parts of India, are a very fierce and formidable race, and there is no method of escaping their pursuit but by climbing up into some immense tree; a moderate size would be no security, for they can break down those of inferior growth, and many travellers have been instantly gored to death, and then trampled to pieces by their feet. They run with a surprising degree of speed, and cross the largest rivers with the greatest ease; and the method which the hunters adopt to destroy them, is to fire upon them from some of their thickest trees.

Although so wild in a state of nature, no animal in the world can be easier tamed; and though they are never quite so docile as the cow, yet they are patient, persevering, and have a greater share of strength. Though the torrid zone is properly their native clime, yet in many parts of Europe they are bred; and the lower order of the Italians are so sensible of their value, that they absolutely consider them as a source of wealth. The animal has such a strong antipathy to fire, that the very resemblance of it occasions them alarm and dread; and the inhabitants of those countries where they most abound, avoid appearing either in scarlet or red.

BULB. There are a number of plants, the roots of which are perennial, while the tops are annual; and as these seem destined to contain the nourishment of a new plant, they are enlarged, and either flattened or rounded, as the variety or species may happen to be. Many of the finest flowering plants are bulbous, and in some places, particularly in Holland, the culture of such bulbs, tulips, and others, for sale, is an important and lucrative branch of trade. Among farmers, the only two bulbous roots that attract much attention, are those of the onion and turnip. Bulbous roots, like the tuberous ones, are preserved with ease, requiring only a temperature of little above freezing to prevent germination, and atmospheric dryness to prevent mouldiness or rotting.

BURNING. In agriculture, burning consists in taking the turf from the land with as much of the earth as will adhere to it, drying it thoroughly, and then either with or without the aid of other fuel, burning it in large pits prepared for this use. The greatest benefits of burning are experienced on clay soils, where a mixture of other earths is required to counteract the natural adhesion of the clay. In burning, all the clay particles are converted to a kind of brick earth, and this, on being spread over the earth, together with the ashes and salts produced in the process, furnishes an excellent dressing, as well as a permanent amelioration in the soil. The brick dust acts as the addition of silicious matter in rendering the earth more friable, and

from its color, it retains the solar heat better than when in its former state. Paring and burning is also destructive of all foul seeds, and of all insects, unless their habitation lies beneath the turf. In this case, the ashes not unfrequently destroy or drive them away. The ashes so made are sometimes mixed with lime and vegetable or animal manures, in the manner of composts, and then applied to the soil with great effect.

BUSHEL. In the time of Henry VIII., it was ordained that the imperial bushel, which is the standard adopted in this country, should contain eight gallons, or thirty-two quarts, and that, according to the statute, each gallon was to contain eight pounds of wheat, troy weight, or twelve ounces, and each ounce was to contain sixty-four kernels growing in the middle of the ear. Accordingly, our common half-bushel measure, to hold sixteen quarts, is thirteen and a-half inches in diameter, and seven and three-quarters of an inch in depth. To show the importance of a strict conformity to this size, or an equivalent one, it is easily seen that with a diminished one in selling, and an increased one in buying, there will be a very considerable injustice to the suffering party. For instance, if the measure is only seven inches and five-eighths, instead of seven and three-quarters, there will be the difference of a pint in every bushel. So if the depth is increased to seven-eighths instead of three-quarters of an inch over seven inches, the half-bushel measure will hold a pint too much. Hence, the honest farmer, in buying or selling, should look well to the size of his half-bushel measure. Even if the bottom of it is rounded or warped up in the centre three-sixteenths of an inch, it will hold not enough by half a pint; and if the stick used on the top to remove the surplus grain were to be crooked three-sixteenths of an inch, it would make about half a pint difference in each measure.

BUTTER. Is too well known to need description; it is merely the oleous portion of milk, first separated in the shape of *cream*, and afterwards still further detached from its aqueous particles, or *butter-milk*, by agitation either by the hand or other motion, called *churning*. Butter is used chiefly in temperate climates; in the south of Europe, and many other places, olive oil is used for similar purposes. The Dutch introduced butter into the East Indies. The Romans used butter no otherwise than as a medicine, never as food. Pliny says that among the barbarous nations it was a delicate dish. The Greeks had not an early knowledge of butter. Their poets, though they make frequent mention of milk and cheese, never mention butter. Cl. Alexandrinus observes, that the ancient Christians of Egypt burnt butter in their lamps at their altars instead of oil; and the Abyssinians, according to Godinus, still retain a practice much like it. Good butter is one of the most wholesome and nutritious of the animal fats; it is necessary, however, that it should be eaten in moderate quan-

tity, and with bread or other farinaceous matter, or it will disagree with the stomach.

BUTTERFLY. An insect well known, and much admired for its beauty : it is bred from the caterpillar. The wings of the butterfly are four in number, and though two of them be cut off, the animal can fly with the two others remaining. If we observe the wing of a butterfly with a good microscope, we shall perceive it studded over with a variety of little grains of different dimensions and forms ; and nothing can exceed the beautiful and regular arrangement of these little substances. Like the tiles of a house, those of one rank are a little covered by those which follow ; and they are of a great variety of figures, some oval, some in the form of a heart, some triangular, and some resembling a hand open ; yet the weight of the wing, though it be covered over with these scales, is very little increased thereby.

CAAMINI. This is a name given by the Spaniards and others to the finest sort of the Paraguay tea. It is the leaves of a shrub which grows on the mountains of Maracaya, and is used in Chili and Peru as tea is with us. The mountains, where the trees which produce this valuable leaf grow naturally, are far from the inhabited parts of Paraguay ; but the people of the place know so well the value and use of it, that they constantly furnish themselves with great quantities of it from the spot. They used to go out on these expeditions many thousands together, and their country was left to the insults of their enemies in the meantime, and many of them perished with the fatigue.

CABAL. A name given to a sort of drink made of dried raisins. The manner in which the Portuguese make cabal is this ; they take out the stones of about twenty pounds of raisins, and then bruising the raisins a little, they put them into a barrel of white wine, in the month of January or February, and let them stand till about Easter. It is then very clear and rich, luscious and palatable to the taste. It is recommended to stop coughs, and give strength to the stomach. It is worth while to try the experiment with the same proportion of raisins to the same quantity of our cider, which would probably prove a fine drink.

CABBAGE. The common cabbage is by far the most valuable, both to man and to the beasts, by whose assistance he is able to make the earth so fertile. It is also the most productive ; for it is believed that an acre of ground will yield a greater weight of green vegetable substance, and thus be more profitable to the farmer, in the shape of cabbage, than in that of any other vegetable matter. It is very abundantly produced by clay soils, which are unfit for turnips, and the farmers who cultivated such soils will find it a vegetable worthy of much attention. The cabbage furnishes a green fodder for cows and sheep, which is at least as good as turnips or carrots, fattening

the animal equally fast, as well as being favorable to the production of milk ; and is far preferable, as it keeps later in the spring, and thus supplies green food when no other can be procured. Cobbett calculated that one-fourth of an acre will yield cabbage sufficient to support a cow the year round. Burying it in the ground where the earth is dry, is probably one of the best methods of preserving cabbage fresh and in good order. Large quantities are annually made into sour krout, an article which forms an important part of ship stores, destined for long voyages, and to the use of which, much of the exemption of sailors from that terrible disease the scurvy, is now to be attributed. There are many varieties of this plant ; but the general properties are the same.

CABBAGE TREE PALM. The *Areca oleracea*, is a native of the West Indies, and grows to the height of one hundred and seventy or even two hundred feet. The leaves, for it has no branches like most other trees, are sometimes twenty feet long. The interior of the leaf is used like hemp and flax for cordage ; the fruit, lying towards the top of the trunk, under the leaves, is in thin snowy flakes, sweeter than the almond ; the pith produces a kind of sago, and the nuts, called areca nuts, yield oil by decoction. In short, every part of this tree is useful ; it is esteemed one of the most beautiful of trees.

CACAO. Chocolate is a kind of cake, or hard paste, the basis of which is the pulp of the cacao, or chocolate-nut, a production of the West Indies and South America. Plantations of cacao are numerous on the banks of the river Magdalena, in South America. They are usually formed in morassy situations, and are sheltered from the intense heat of the sun by larger trees, which are planted in them. There are two principal crops of cacao in the year ; the first in June, and the second in December. As soon as the fruit is ripe, it is gathered and cut into slices ; and the nuts, which are, at this time, in a pulpy state, are taken out, and laid in skins, or on leaves to be dried. They have now a sweetish acid taste, and may be eaten like any other fruit. When perfectly dry, they are put into bags, each containing about an hundred weight, and, thus packed, are exported to foreign countries. Previously to being formed into chocolate, these nuts are generally roasted or parched over the fire in an iron vessel, after which process their thin external covering is easily separated. The kernel is then pounded in a mortar, and subsequently ground on a smooth, warm stone. Sometimes the arnatto is added ; and with the aid of water the whole is formed into paste. This is put whilst hot, into tin moulds, where in a short time it congeals ; and in this state it is the chocolate of the shops.

By the natives of South America, the chocolate nuts are used for food. A white, oily matter, about the consistence of suet, is also obtained by bruising them, and boiling the pulp. The oil is by this means liquified, and rises to the surface, where it is left to cool and

congeal, that it may be more easily separated. This, which is called the butter of cacao, is without smell, and, when fresh, has a very mild taste. Its principal use is an ingredient in pomatums. From the nuts, when slightly roasted, an oil is sometimes obtained by pressure, which is occasionally used in medicine.

CACAO TREE. The tree that produces the chocolate-nut, and is a native of South America. In size and shape, it somewhat resembles a young blackheart cherry. The flower is of a saffron color, extremely beautiful, and the pods, which in a green state are much like a cucumber, proceed immediately from all parts of the body and larger branches. As they ripen they change their color, and turn to a fine bluish red, almost purple, with bluish veins. The cacao-tree bears two crops a year, yielding at each from ten to twenty pounds weight, according to the soils and seasons. It is a tree of great delicacy: it is obnoxious to blights, and shrinks at the first appearance of drought.

CALABASH TREE. The calabash-tree is the production of the West Indies, and the continent of America, about the height and dimensions of an apple-tree, with crooked, horizontal branches, wedged-shaped leaves, pale white flowers on the trunk and branches, and a roundish fruit, from two inches to a foot in diameter. The uses to which the fruit of the calabash-tree is applied are very numerous. Being covered with a greenish yellow skin, which encloses a thin, hard, and almost woody shell, it is employed for various kinds of domestic vessels, such as water-cans, goblets, and cups of almost every description. So hard and closely-grained are these shells, they may even be put several times on the fire as kettles, when they contain some fluid, without any injury. When intended for ornamental vessels, they are sometimes highly polished, and have figures engraven on them, which are variously tinged with indigo and other colors.

CALCINATION. A term given by chemists to that process by which minerals, when exposed to a certain degree of heat, are deprived of their water; stones converted into lime; and metals into calx. A metal never becomes calcined, but when in contact with air: the more extensive this contact, the larger is the quantity of metal which becomes calcined: and Lavoisier has proved, that a given quantity of air can only serve for the calcination of a given quantity of metal. The metal thus calcined is termed a metallic calx.

CALCIUM. This is the name of a metal discovered by Sir H. Davy, and constitutes the basis of lime. It is of a silver color, burns with great brilliance when brought in contact with atmospheric air, and absorbs oxygen so rapidly, that it instantly assumes the form of lime. The term *calcareous*, as applied to earths containing lime is derived from this word; and in the form of carbonate of lime, or common limestone, there is perhaps no substance more universally

diffused, or which acts a more important part in the economy of vegetation.

CALENDAR. A table containing the days, months, festivals, &c., happening in the year. The Roman calendar from which ours is borrowed, was composed by Romulus, who made the year consist of no more than three hundred and sixty-four days. Numa Pompilius made it consist of twelve lunar months of thirty and twenty-nine days alternately, which made three hundred and fifty-four days; but being fond of an odd number, he added one day more, which made it three hundred and fifty-five days; and that the civil year might equal the sun's motion, he added a month every second year. Julius Cæsar, as a farther improvement, made the year consist of three hundred and sixty-five days, and left the six hours to form a day, at the end of every fourth year, which was added to the month of February.

This calendar was called the *Julian* or the *old style*, in contradistinction of the *new style* introduced by Gregory. In 1582, Pope Gregory XIII, finding perplexity to arise in the computation of time, from some errors in the Julian calendar, thought proper to order the formation and adoption of a new style of reckoning. The astronomers and mathematicians whom he summoned to Rome for that purpose, after spending several years in investigating the subject, and adjusting the principles of another system, produced what has been since called the *Gregorian Calendar*. In forming this method of computation eleven days were lopped off from the old calendar; leaving out in the future, one *bissextile* day every hundred years, and making every four hundredth a leap year. The Gregorian style, thus formed, was soon adopted by all the catholic states; and in most of the protestant countries, before the commencement of the 18th century. But it was not until the year 1752, when Britain and her dependencies, by an act of parliament, adopted the *new style*; at the same time, the *Ecclesiastical year*, which had before commenced on the 25th of March, was made to coincide with the *civil year*, and ordered, like that, to be computed from the first of January.

CALM. In metereology that state of the air and water when there is no wind stirring. A calm is more terrible to a seafaring man than a storm, if he has a strong ship, and sea-room enough; for under the line, excessive heat sometimes produces such dead calms, that ships are obliged to stay two or three months, without being able to stir one way or the other. Two opposite winds will sometimes make a calm. This is frequently observed in the gulf of Mexico, at no great distance from the shore, where some gust, or land wind, will so poise the general easterly wind, as to produce a perfect calm.

Calms are never so great in the ocean as in the Mediterranean, by reason the flux and reflux of the former keep the water in a continual agitation, even where there is no wind; whereas, there being no tides in the latter, the calm is sometimes so dead, that the face of

the water is as clear as a looking-glass; but such calms are almost constant presages of an approaching storm. On the coasts about Smyrna, a long calm is reputed a prognostic of an earthquake.

CALORIC. This name is applied to fire, or the substance which produces the sensation we call heat, but never to the sensation itself, or the effect produced by fire. Animal heat is preserved chiefly by the inspiration of atmospheric air. If the hand be put upon a hot body, part of the caloric leaves the hot body, and enters the hand; this produces the sensation of heat. On the contrary, if the hand be put upon a cold body, part of the caloric contained in the hand leaves the hand to unite with the cold body; this produces the sensation of cold. Caloric comes to us from the sun, at the rate of two hundred thousand miles in a second of time. Caloric may be procured by combustion, percussion, friction, the mixture of different substances, and by means of electricity and galvanism. In a latent state, caloric exists in all substances with which we are acquainted; but it combines with different substances in very different proportions.

On agriculture, this agent acts with great effect, since the soil is cold or hot according as it retains or parts with the caloric it receives from the sun. Soils that are black or white receive the least benefit from heat; the black mould, while it acquires heat with rapidity, giving it off still more freely; and the white soils, owing their color principally to clay that retains moisture very strongly, scarcely feel its influence, the heat being carried off in evaporating the water. The experiments of Rumford and Leslie show, that a vessel covered with lamp-black radiated heat at the rate of one hundred degrees, while one made of bright tin plate, gave out only twelve degrees. Soils in which mould or black earth is properly combined with silex and alumine, will retain heat the longest, as the black gives it out to the others instead of radiating it into space. A melon laid on a bed of powdered charcoal, will ripen, when one on common earth will remain green and immature.

CALVES. The rearing of calves is an important branch of rural economy. The value of the future ox or cow is greatly depending on the treatment the calf receives. The subject is of more consequence to the farmer than generally supposed. Where circumstances will permit, allowing the calf to run with the cow and draw its food directly from her, is probably the best method, since it is that of nature; but as the milk for dairy purposes is valuable, breeders have substituted many modes of feeding the calf, in which milk is partly dispensed with, some other nutritive substance taking its place. As a general rule, the calf should be allowed to suck the cow till the milk is good. Some allow them to suck a week or fortnight, according to their strength, but it has been found that where calves are to be taken off, the earlier it is done, the better, both for cow and calf, each making less ado at the separation. After removed from the cow, the

following mode of feeding calves has been recommended. For the first few meals, new milk; the next few meals, new milk and skimmed milk mixed together; then skim milk alone, or porridge made of milk, water, meal, and sometimes oil-cake or linseed meal. In the season of making cheese, the whey may be given to them.

When fed from the pail, calves require about two gallons daily; but care must be taken not to give it to them too cold, as it will cause them to purge. When this is the case, one or two spoonfuls of rennet in the milk will be a good remedy. Great regularity should be observed in feeding calves, and they should always have sweet grass, or good clover hay on which to nibble at intervals of their more regular food. They are easily taught to eat carrots or turnips, small ears of corn, and indeed almost every thing that is eaten by cattle. And, if the farmer would see them thrive well, he must constantly look to their wants. If in the first year they become stunted, no subsequent effort will advance them to the size they might have attained, provided in this period they had been amply fed.

CAMEL. The camel is one of the larger quadrupeds, being six or seven feet from the ground to the highest part of the back, and it carries the head when erect about nine feet above the plane of its position. The carcass weighs three or four hundred pounds; but the size and weight are far from alike in all. The natural abode of this animal is in the warmer climates, and places abounding with sand, where food is scanty, and exposure to long protracted privations are unavoidable; insomuch that, from the configuration of its foot, difficulty is experienced in treading another soil, and in the richer or more fertile countries where attempts have been made for its naturalization, it grows feeble, languishes, and dies.

The motion of the camel is unlike that of most other animals; both the feet on the same side are successively raised, and not alternately like those of the horse. Its pace is naturally slow, and when accelerated, the rider experiences the most severe jolting, which it requires continued practice to endure. Properties which are denied to the greater part of quadrupeds are possessed by the camel, and in their fullest extent converted to the use of mankind. It is docile, patient of labor, and capable of abstinence in a wonderful degree; it can endure scorching heats with impunity; it feeds on thistles, on the stunted shrubs and withered herbage of the desert, and can pass successive days in total want of water; thus seeming as if purposely devised by nature for the most cheerless and inhospitable regions.

But these properties are improved to a great extent, by the mode in which the camel is reared. At the earliest period, the legs are folded under the body, in which position it is constrained to remain. Its back is covered with a carpet, weighed down by a quantity of stones gradually augmented: it receives a scanty portion of food; it is rarely supplied with water; and, in this manner, is regularly

brought up in a system of privation. When the time of trial has elapsed, and it is broke into subservience, it kneels at the command of the master, who either mounts it himself or loads it with a heavy burden ; and, trusting to its strength, and the privations it can suffer, he ventures to traverse the trackless desert.

The camel annually casts its hair in spring ; and in the space of three days is as bare as a sucking pig. During that interval, the keeper is careful to tar it over, in order to preserve it against the annoyance of the flies. But the color and abundance of hair depend entirely on the particular species of camel, and the climate which it inhabits : that of the Arabian Camel is thin and whitish ; that of the Bactrian camel thicker and darker colored. From the hair a coarse kind of clothing, almost impermeable by water, is made for camel-drivers and shepherds ; and the same commodity, for an analogous purpose, is used as wrappers of merchandise long exposed to wet in heavy rains. But in Persia and the Crimea more valuable manufactures are produced in narrow cloths of different colors, and fine stockings, of which white are the highest priced. It is wrought into shawls, carpets, and coverings for the tents of the Arabs. According to Pallas, the Tartar women of the plains manufacture a kind of warm, soft, and light narrow cloth from the hair of the Bactrian or Tauridan camel, preserving the natural color. The hair of different colors is an article of export from Asia and Africa ; its value is proportioned to the fineness and color, that which is black being the dearest.

As Mahomet the prophet himself rode a camel, it is considered a sacred animal in the east, nor will his votaries at all times admit of its being devoted to the service of Christians. They seldom eat its flesh themselves, not so much from entertaining any scruples on the lawfulness of doing so, as from reluctance to sacrifice an animal so valuable to them ; but where fanaticism prevails, selling it to Christians would be deemed profanation. After the annual pilgrimage to Mecca, the camel which carries the standard of Mahomet is ever afterwards exempt from labor, and the Mahometans even believe that it will participate in the pleasures of a future life.

CAMELEON. A species of lizard, abounding in some parts of Egypt. This creature, with its tail extended, is about fifteen inches long. Its usual color is of a light green, though it varies its dye according to that of whatever plant or flower the animal rests upon. The cameleon devours prodigious quantities of flies ; but being very slow and inactive, it would be impossible for him to take his prey, had not nature taken care to supply those defects, by a peculiar gift, which he improves with great success : for, sitting as if he were inattentive to his prey, the unthinking fly uses no caution in approaching him, when of a sudden, he darts out a tongue about six inches long ; the end of which is concave, and covered with a glutinous matter, so

that is impossible for the fly to escape destruction. The foregoing description is from Lord Sandwich's voyage. Sonini, on the other hand, says, that the changing of color in cameleons, is not to be ascribed to the objects presented to them; and that their different affections increase or diminish the intensity of the tints, which cover, and, as it were, marble their very delicate skin.

CANARY BIRD. A native of the Canary Islands. They have a variety of coloring; some white, some mottled, some beautifully shaded with green; but they are more esteemed for their song than their beauty, having a high piercing pipe, continuing for sometime in one breath without intermission, then raising it higher by degrees, with great variety. They are capable of surprising improvement from imitation: the only art necessary with those that have no very fine note, is to breed them up with one of a more melodious voice. A canary bird, in London, was taught to pick up the letters of the alphabet at the word of command, so as to spell any person's name in company; and this the little animal did by motions from his master, which were imperceptible to every other spectator.

CANDLE. This is a long, but small cylindrical body of tallow, wax, or spermaceti, formed on a wick composed of linen or cotton threads loosely twisted, and is used for artificial light in dwelling-houses or elsewhere. A tallow candle made of the tallow of a bullock and sheep, is considered best; that made of the fat of hogs, unless chemically prepared, is soft, has an offensive odor, and emits a black smoke. Candles are dipped or moulded; the former by having the wick successively immersed in melted tallow, and the latter by having the wick confined in a mould, and then having the melted tallow poured on it.

The Chinese obtain from the tallow-tree a kind of vegetable fat, with which they make a considerable portion of their candles, which are firmer than those of tallow, and free from all offensive odor; but they are not equal to those of wax, or spermaceti. Cheap candles are also made of tallow, and even of grease of too little consistence to be used, without the contrivance of being coated with the firmer substance of the tallow-tree or of wax. The surface of these candles is sometimes painted red. Their wicks are made of different materials. The candle makers at Munich prepare tallow candles with wooden wicks, which afford about the same quantity of light as a wax candle, burn also with great steadiness and uniformity, and never crack or run.

CANDLESTICK. A household utensil, contrived to hold one or more lighted candles. Larger and more stately candlesticks, contrived for holding a great number of candles, are called *branches* and *girandoles*, and when made of glass, *lustres*. The *golden candlestick* was the richest utensil in the Jewish tabernacle. It was made of solid gold, and weighed a talent; and, according to Cumberland, the

value of it, exclusive of the workmanship, was £5076. It contained seven lights, six branching out in three parts on each side of the upright stem, and one on the top of it. Each branch was adorned with cups, knots, and flowers, alternate and equidistant; and on the top of each was fixed a lamp, in form of an almond, which might be put on or taken off occasionally; and in these were put the oil and the wick, or the cotton, which was drawn in or out by tongs or snuffers; under them were snuff-dishes for receiving the sparks, or refuse of the oil that fell from the lamps. This candlestick was placed in the ante-chamber of the sanctuary, on the south side, and served to illuminate the altar of perfume, and the tabernacle of the show-bread: and it was the business of the priest to light the lamps every evening, at the time of incense, and to extinguish them at the same time every morning.

In Solomon's temple there were ten golden candlesticks of the same form with that described by Moses; five on the north, and five on the south side of the holy place. But after the Babylonish captivity, the golden candlestick was placed in the temple, as it had been before in the tabernacle of Moses; and when the temple was destroyed, it was deposited in the Temple of Peace, built by Vespasian; and the representation of it still remains on the triumphal arch, at the foot of Mount Palestine, on which Vespasian's triumph is delineated.

CANE. A kind of strong Indian reed, used for walking sticks; also the plant which yields the sugar, and grows freely in the East and West Indies, and parts of North and South America. The skin of the sugar-cane is soft, and the spongy matter or pith it contains, very juicy. It is now extensively cultivated in Louisiana, Alabama, and some of the other southern States of the American Union. It has become an important branch of our rural economy.

CANOE. The term generally used to designate the small vessels which uncivilized people, living near the water, use. In the East Indies, there is a kind of boat which goes by this name, sometimes from forty to fifty feet long, and five or six broad. The North American Indians generally impel their canoes with paddles, which have a very large blade, and are managed perpendicularly. The canoes of Canada are of the most fragile texture, and of so little weight, that, in passing from one river to another, the boatmen carry them on their heads across the portages. They are mostly covered with bark, the pieces of which are sewed together with a kind of grass. This bark is generally not more than a quarter of an inch in thickness; yet in these frail vessels, the Indians and Canadians do not hesitate to descend very dangerous rapids. The Esquimaux were exceedingly dexterous in the management of their canoes. These consist of a light, wooden frame, covered with seal-skins, sewed together with sinews. The skins are not only extended round the bottom and sides, but likewise over the top, forming

a complete deck, and having only one opening to admit the Indian to his seat. The Greenlanders and Esquimaux use the same kind of canoes, and it is astonishing, when we consider their insignificant construction, at what a distance from the regions they commonly inhabit, these people, especially the former, are found in them.

CAP. A garment serving to cover the head, and made nearly of its figure. The era of caps and hats is referred to the year 1449, the first seen in Europe being at the entry of Charles VII. into Rouen; from that time they began, by little and little, to take place of the hoods or chaperons, that had been used till that period. The Romans were many ages without any regular covering for the head: when either the rain or sun was troublesome, the lappet of the gown was thrown over the head; and hence it is that all the ancient statues appear bareheaded, excepting sometimes a wreath, or the like. And the same usage obtained among the Greeks, where, at least during the heroic age, no caps were known.

The cap was the head-dress of the clergy and graduates. The giving of the cap to the students in the universities, was to denote that they had acquired full liberty, and were no longer subject to the rod of their superiors, in imitation of the ancient Romans, who gave a *pileus* or cap to their slaves in the ceremony of making them free. Hence, also, on medals the cap is the symbol of Liberty, whom they represent holding a cap in her right hand by the point. When this cap was exposed to the view of the people on the top of a spear, as in the case of the conspiracy which had occasioned the death of Cæsar, it was intended as a public invitation to the people to embrace the liberty that was offered to them by the destruction of their tyrant. This thought of the conspirators on occasion of this event, was not new; for Saturnius, in his sedition, when he had possessed himself of the Capitol, exalted a cap on the top of a spear, as a token of liberty to all the slaves who would join with him; and though Marius, in his sixth consulship, destroyed him for that act, by a decree of the senate, yet he himself used the same expedient afterwards to invite the slaves to take arms with him against Sylla, who was marching with his army into the city to attack him.

The Chinese have not the use of the hat, like us, but wear a cap of a peculiar structure, which the laws of civility will not allow them to put off: it is different for the different seasons of the year; that used in summer, is in form of a cone, ending at the top in a point. It is made of a very beautiful kind of mat, much valued in that country, and lined with satin: to this is added, at top, a large lock of red silk, which falls all round as low as the bottom; so that in walking, the silk, fluctuating regularly on all sides, makes a graceful appearance: sometimes instead of silk, they use a kind of bright red hair, the lustre whereof no weather effaces. In winter they wear a kind of plush cap, bordered with martlet's or fox's skin; as to the rest, like

those for the summer. Nothing can be neater than these caps; they are frequently sold for eight or ten crowns; but they are so short that the ears are exposed.

CARBON. Charcoal is a word often employed synonymously with carbon: but, although charcoal is the form under which carbon most commonly occurs, yet it is in this form mixed with several extraneous ingredients. The diamond was concluded, by Guyton Morveau, to be the only form of pure carbon; but the experiments of Allen and Pepys have tended to show that these hard substances, although so widely different in external character and appearance, are chemically the same; the difference between them seeming to result from the different state of aggregation of their particles. It further seems that the diamond is absolutely free from both water and hydrogen; and it is in this particular, as well as in the mode by which its particles are aggregated, that the difference seems to obtain between charcoal and the diamond. Diamond converts iron into steel; which power is likewise characteristic of charcoal.

Charcoal appears to be the same substance from whatever wood it is procured, but it is usually made upon a large scale from oak, chestnut, elm, beech, or ash wood. Lampblack may be regarded as a very pure carbon, after it has been heated red-hot in a very close vessel. This is prepared by causing the dense smoke, arising from refuse resin burnt in a furnace, to be collected.

Carbon forms the base of all wood, and consequently of all trees and plants, and is, therefore, one of the most important principles of nature. To the farmer it is one of peculiar interest. Plants, however, never take up the minutest particle of carbon while in that state, if ever so finely reduced. By a wise provision of Providence, an inexhaustible reservoir of carbonic acid gas, carbon converted into air, is found in the atmosphere, which readily combines with water, and in that state is taken up by the roots for the support of the plant. The leaves of trees also perform a species of respiration, by which carbonic acid gas is taken into the plant during one-half of the day, to be decomposed by the solar rays; and, while the carbon is retained, the oxygen is set free, and thrown off by the plant to purify the air.

CARIOLE. A name given by the Canadians to a sledge, by which they transport themselves over the snow, from place to place, in the most agreeable manner, and with a degree of celerity that appears almost incredible; for with the same horse, it is possible to go eighty miles in a day, so light is the draught of one of these carriages, and so favorable is the snow to the feet of the horse. This cariole will hold two persons and a driver, and is usually drawn by one horse. Its shape is varied according to the fancy and taste of the owner.

CARMINE. The most splendid of all red colors is made from the cochineal insect. It is deposited from a decoction of powdered cochineal in water, to which alum, carbonate of soda, or oxyde of tin,

is added. As the beauty of this valuable color is affected, not only by the mode of applying it, but also by the quantity of the ingredients mixed with it, we find various recipes for the preparation of it. The manufacturers which prepare the best carmine carefully conceal the method. The best natural cochineal is formed in Mexico.

CARNIVOROUS. An epithet generally applied to animals of every description, that subsist for the most part or entirely on animal food. In a more limited sense we understand by carnivorous animals, those only of a savage and voracious nature, assimilating in our ideas some instinctive ferocity of character in the manners of those creatures when seeking and attacking their prey, as well as actually feeding on flesh. We naturally consider, for this reason, among the principal carnivorous animals, the lion, the tiger, and the wolf; or among birds, the eagle, and the kite, with a host of other rapacious creatures, upon which nature has bestowed pre-eminent advantages of courage, strength, and arms to aid them in seizing upon, and tearing into pieces, those animals on which they feed; they have either formidable canine teeth or fangs; claws, or talons; the quadrupeds possessing both, and the birds the latter; fishes with very few exceptions are carnivorous, but their only offensive weapons are the teeth, or in some species the spines and prickles disposed on various parts of the body.

It is a dispute among naturalists, whether or not man be naturally carnivorous. Some contend that the fruits of the earth were intended as his sole food; and that it was necessity in some places, and luxury in others, that first prompted him to feed upon his fellow animals. Pythagoras and his followers looked upon it as a great impiety; and strictly abstained from all flesh, from the notion of a metempsychosis; and their successors, the Bramins, continue the same to this day.

In this, however, as in most other controversies, the truth lies between the two extremes; there is an obvious connexion between the conformation of the teeth, stomach, and intestines, and the nature of the food upon which an animal subsists; and according to the rules laid down by comparative anatomists on this subject, man was designed to use a mixed food in common; but, if circumstances required it, his organs were adapted to digest either animal or vegetable substances. His teeth are neither calculated for grinding coarse vegetable food, nor for tearing the flesh, or breaking the bones of animals. They are only fitted for masticating such matter when divided by machinery or prepared by the operation of heat, in the several processes of cooking.

CARROT. It is believed that this plant was brought into Europe from the Island of Crete. It was carried to England by the Flemish refugees, during the reign of Elizabeth, and the leaves were then used by ladies in their head dresses at evening parties. The root of the

wild carrot is white and small, as well as dry and strong flavored ; which illustrates the remarkable improvement that has been effected in our common esculents by cultivation for a long series of years. The various uses of the carrot in cookery are well known. But although it contains much nutriment, it is difficult of digestion, particularly if eaten raw or imperfectly boiled. Carrots are an excellent fodder for horses, either alone or mixed with hay ; and if given to cows in winter, or the early part of spring, they are said to cause a great increase of milk, which will have a much less offensive taste and smell than when they are fed on turnips. Crickets are so fond of these roots, that they can easily be destroyed by making a paste of flour, powdered arsenic and scraped carrots, and leaving the compound near the places of their resort. They are a profitable crop for the farmer, being raised at an expense of eight or ten cents per bushel, and an acre of land yielding from five hundred to one thousand bushels. For stock they cannot be estimated at less than forty cents a bushel, so that the net profits of the carrot will be from one hundred and fifty to three hundred dollars to the acre.

CART. For a long period the use of the waggon for farming purposes was almost unknown in this country. The reliance was on the cart and oxen, instead of the waggon and horses. When a boy we never saw the latter ; but as the latter increased, the former gave way ; and now, the use of the cart is mostly confined to farms on which cattle alone are used, and some particular sections of country. It is a question however which deserves serious consideration by farmers, whether more on the whole has not been lost, than has been gained by the change. On grain-growing farms, where much ploughing is to be performed, horses are indispensable, and the waggon of course may be preferred ; but, there are multitudes of farmers who, we think, would greatly promote their interests, by discarding their waggon and its attendant span of inferior horses, and substituting in their place, the old fashioned and less costly cart, and a yoke or two of prime working oxen.

CASHMERE GOAT. A nobler species of common goats, is descended from the goat of Thibet, which pastures on the Himalaya. The goats of Thibet and Cashmere have the fine curled wool close to the skin, just as the under hair of our common goat lies below the coarse upper hair. The wool is shorn in the Spring, shortly before the warm season—the time when the animal, in its natural state, seeks thorns and hedges in order to free itself from the burden of its warm covering. All the hard and long hairs are picked most carefully. The wool, thus purified, is washed, first in a warm solution of potash, and afterwards in cold water, in which process felting must be carefully avoided. It is then bleached upon the grass, and carded for spinning. The shawl-wool is three times died—before carding, after spinning, and in the shawl. The Asiatics avoid spinning the

wool hard, in order that the shawl may be soft. They use a spindle, which consists of a ball of clay, with an iron wire attached. The finger and thumb of the spinner are kept smooth by steatite powder.

CAT. A domestic animal, whose good and ill qualities are too generally known to need a description. The ancient Egyptians paid a religious homage to this little animal; and among them nothing could more expose a man to popular rage, than killing a cat. The following is, in substance, related by Diodorus Siculus, as a fact of which he was an eye-witness. While ambassadors from Rome, which was at that time the proud mistress of the world, were in Egypt, and were treated by the Egyptians, not only with all the courtesy of respect, but with all the servility of fear, one of their attendants happening unintentionally to kill a cat, this circumstance excited such a general horror and indignation, that neither the remonstrances of the officers sent by Ptolemy, their king, nor the fear of the Romans, could save the unhappy man from the fury of the populace. "What is called the *Wild Cat*, is an animal in most respects similar to our common cats, but different in its disposition and dimensions. It is much larger, stronger, and fiercer, than any of our domestic cats, and seems to be of the same disposition and color as the wolf." Strings for musical instruments, of superior and unrivalled excellence, are made of catgut.

CATAMOUNT. One of the most fierce and dangerous quadrupeds of North America. It is supposed to be the same animal which the ancients called lynx, and which is known in Siberia by the name ounce. In the form of its body it much resembles a common cat; it is generally of a yellow color, bordering upon a red or sandy, and is larger than the largest dogs. Some years ago, a catamount, at Bennington, in Vermont, took a large calf out of a pen, where the fence was four feet high, and carried it off upon his back. With this load it ascended a ledge of rocks, where one of the leaps was fifteen feet in height. Two hunters finding the catamount upon a tree, one of them discharged his musket, and wounded it in the leg. It descended with the utmost agility and fury, did not attack the men, but seized their dog by one of his ribs, broke it off in the middle, and instantly leaped up the tree again with astonishing swiftness and dexterity. The other hunter shot him through the head, but his fury did not cease but with the last remains of life.

CATARACT. In farriery, a disease in the eyes of horses, in which the crystalline humor is rendered opaque, and the vision impeded or destroyed. The only certain method of cure in these complaints is to remove the lens by means of extracting or couching. By the first mentioned operation, an incision is made into the eye, and the opaque lens taken out—by the second, it is depressed by the point of a couching needle, thrust into the eye, and being carried to the lower part of the chamber of the eye, or vitreous humor; it is left

there to be absorbed. The first operation is the more effective, but the more hazardous of the two, owing to the inflammation which succeeds. The second is tedious, and sometimes fails ; but it is free from the risk of inflammation.

CATTLE. The value of the ox tribe has been in all ages and tribes highly appreciated. The natives of Egypt, India, and of Hindostan seem alike to have placed the cow among their deities, and, judging by her usefulness to all classes, no animal could perhaps have been selected whose value to mankind is greater. In nearly all parts of the earth cattle are employed for their labor, for their milk, and for their food. In southern Africa they are as much the associates of the Caffres as the horse is of the Arab. They share his toil, and assist him in tending his herds ; they are even trained to battle, in which they become fierce and courageous. In central Africa, the proudest ebony beauties are to be seen on their backs. They have drawn the plough in all ages ; in Spain they still trample out the corn ; in India raise the water from the deepest wells to irrigate the thirsty soils of Bengal. When Cæsar invaded England, they constituted the chief riches of that country ; and they now form, in that country, as well as in our own, no small item of the wealth of the inhabitants.

Within the present century, great improvements have been made in the breeds of domestic cattle, particularly in Great Britain, where Bakewell, and Collings, and Bevey, with other spirited individuals, have rendered the most valuable service in this important enterprise. Within this period, the average weight of English cattle has risen one-third ; and the present appearances do not indicate that this increase has reached its highest point. The great improvements already effected, have been made by judicious crosses, and breeding with reference to certain desirable qualities of form, size, milk, or aptitude to fatten ; and these objects have been attained in some of the best modern breeds of cattle to an extent that would once have been deemed impossible. It is evident that care must be taken, or there will exist a tendency to retrograde to the original standard ; a tendency which will become less and less, as the type and constitution of the improved breeds recede farther from the point of their origin, and of course more fixed and stable.

The breeds of cattle at present in most repute, and beyond all competition in any other varieties, are the Herefords, the Devons, and the Short-Horns, including several distinct crosses. Indeed, it is scarcely possible to conceive of more perfect models of form and beauty among animals, than are to be found among those named, particularly the high-bred varieties in the latter classification. Great pains have latterly been taken to introduce into the United States the very best breeds of Europe, and finer herds of cattle are nowhere to be found than now exist in Kentucky and Ohio, which States have taken the lead in this laudable business. As to the general treatment of cattle,

our plan does not embrace it any further than to remark; that cattle require kind treatment, plenty of good food at all times, and protection from the severity of our winters. On these things, next to skilful breeding, the excellence of cattle is mainly to depend. See *Youatt and Martin on Cattle*.

CAULIFLOWER. This is a species of cabbage. What is the head in common cabbage, in the cauliflower is a mass of buds and flowers, possessing a richness and delicacy seldom found. It is the most curious, as well as the most delicately-flavored, of the numerous varieties of the cabbage family. The white flower buds form a large, firm head, surrounded by long, green leaves. Its history is not so well known as that of some other plants, less valuable in the culinary department. On its being introduced into England from the island of Cyprus, about the beginning of the seventeenth century, much attention was paid to its culture, by which means its appearance and character have been greatly improved. In our own country, it is much less known than its merits deserve. To show to what an enormous size it can be made to attain under skilful management, we mention a single plant raised in the garden of the late Hon. Peter C. Brooks, of Medford, Mass. The bare flower measured thirty-eight inches in circumference, and weighed six pounds and five ounces.

CAUSTICITY. A substance is said to be caustic when it produces the same effect on the tongue as that of actual fire; that is, an immediate sensation of burning, followed by a slight disorganization of the surface actually in contact. Thus alkalies are called caustic when deprived of carbonic acid, because, when concentrated, they then burn and blister the tongue almost instantly. Caustic substances are also generally corrosive, or such as act on organized matter, and decompose it with rapidity. The term caustic, prefixed to the alkalies and earths to distinguish the pure or decarbonated state, is now almost always omitted as unnecessary, by the use of the term carbonic; thus to the terms caustic potash, and mild potash, are substituted those of potash, and carbonate of potash, respectively. We also say lime, and the carbonate of lime. Caustic medicines are principally used to reduce irregular excrescences of the flesh.

CEDAR. A well known evergreen, very like the juniper in appearance, which flourishes in cold mountainous places. The leaves are much narrower than those of the pine tree, and the seeds are produced in large cones. The most celebrated species is that of Lebanon, which is also found in Russia, and which is introduced by transplanting into various parts of Europe and America.

CELERY. This is a hardy biennial plant. The blanched leafstalks are a very excellent raw salad. It is supposed to be a native of Great Britain, and, in its wild state, is found in marshy grounds and ditches, having a coarse, rank taste. Under judicious cultivation, it is surprisingly altered, becoming sweet, mild, and crispy. There

are many varieties, but what is called the white solid, is usually esteemed the best. It is produced from seed, and one ounce of seed is sufficient for a thousand plants. It requires a soil rather moist, rich in vegetable mould, but not rank, from new unrotted dung. Some of the New Jersey gardeners, who supply the New York market, have raised each 60,000 heads in a season, which, at six cents the head, the wholesale price, would amount to \$3600. This shows how profitable its culture may be made, small as the business may appear. If it were generally understood how easily it is produced, few only would neglect to raise enough for their own families. For the culture of it, see *Schenck's Text Book*, and *Buist's Family Kitchen Gardener*.

CELLAR. An important appendage to every dwelling is the cellar, and great care should be taken to have this so arranged that the full benefit desired from it may be obtained. The cellar should be well walled with stone or brick, laid in cement; if inclining to be wet, it should be drained, so as to present a hard, smooth surface, and this will be better if covered with clean gravel. Cellars should wholly exclude from frost, without being too warm, as fruit and vegetables, kept in a warm cellar, will not be as good as in one of an equally dry but lower temperature. Since the commencement of the cultivation of roots in this country to a considerable extent, and since the making of pork from steamed apples and potatoes has succeeded so well, cellars attached to barns and piggeries have become necessary, and are already constructed in many cases. Cellars of this kind for the reception of roots, should be made so that cart or waggon loads of fruit or roots can be thrown into them at once, without the labor of repeated handling.

CHALK. Compost limestone, or carbonate of lime, passes into chalk, when the particles that compose the mass are so loosely connected as to render it friable or capable of easy division; in its essential qualities it does not differ materially from unburnt lime. Chalk is extensively used instead of lime for agricultural purposes in many parts of England, where it abounds. In the United States there is no chalk, properly so called. The immense beds of white marl, found in some parts of western New York, are a near approach to it, and the value of such beds as a resource for easy liming soils, will be better appreciated hereafter than it now seems to be.

CHAMOIS GOATS. The Chamois inhabits the most inaccessible parts of the woody regions of the great mountains of Europe. He bounds over the chasms of rocks—he springs from one projection to another with unerring certainty—he throws himself from a height of twenty or even thirty yards upon the smallest ledge, where there is scarcely room for his feet to plant themselves. This extraordinary power of balancing the body—of instantly finding the centre of gravity,—is a peculiarity of all the goat tribe, to which the Chamois

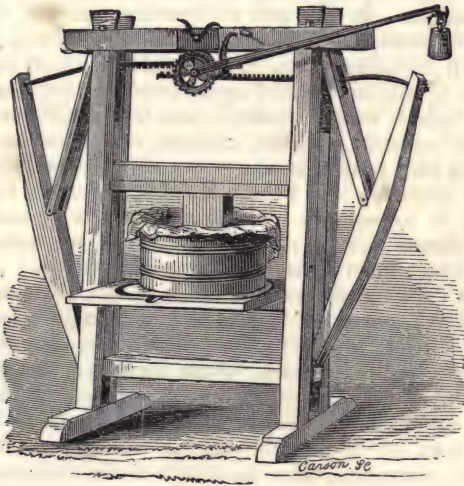
is nearly allied. The ability of the eye to measure distances, with such undeviating exactness, is associated with this power of finding the centre of gravity. In the Chamois these are instinctive faculties, which he possesses almost from the moment of his birth. They are not the result of training; for the young Chamois has only to acquire the necessary strength to able him to imitate the feats of his more practised companions.

CHARCOAL. A kind of coal that is made of wood half burnt, under a covering of turf and dust. The microscope discovers a surprising number of pores in charcoal; they are disposed in order, and traverse it lengthwise. If a piece be broken pretty short, it may be seen through with the microscope. In a range the eighteenth part of an inch long, Dr. Hook reckoned one hundred and fifty pores. Charcoal is a powerful antiseptic; consequently it has lately become a practice to char casks, or to burn charcoal in them, before filling them with water for a sea-voyage; by this means, it is said, water may be kept sweet during the longest voyage. There is one property of charcoal, that ought to be universally known; it is its wonderful power of consuming respirable air. Mr. Lavoisier found that one pound of charcoal, in burning, actually consumed two pounds nine ounces of oxygen or vital air. Hence the extreme danger, or rather almost inevitable death of persons sleeping in a close room with burning charcoal by the bed-side.

Charcoal is insoluble in water, destroys the odor, color, and taste of many substances; and hence, its use in the arts and in the purification of tainted meats and putrified waters. It also separates from water any decayed animal matters or coloring substances which it may hold in solution. Hence, its use in filters for purifying and sweetening impure river or spring waters, or for clarifying syrups and oils. In or upon the soil, charcoal, for a time, will act in the same manner, will absorb from the air moisture and gaseous substances, and from the rain and flowing waters, organized matters of various kinds, any of which it will be in a condition to yield to the plants that grow around it, when they are such as are likely to contribute to their growth.

Charcoal has the property also of absorbing disagreeable odors, in a remarkable manner. Hence, animal food keeps longer sweet when placed in contact with it; hence, also, vegetable substances, containing much water, such as potatoes, are more completely preserved by the aid of a quantity of charcoal. It exhibits, also, the still more singular property of extracting from water a portion of the saline substances it may happen to hold in solution, and thus allowing it to escape in a less impure form. The decayed, half carbonized roots of grass, which have been subjected to irrigation, may act in one or all these ways, on the more or less impure water by which they are irrigated; and thus gradually arrest and collect the materials which are fitted to promote the growth of the coming crop.

Charcoal may be applied with advantage, in the powdered state, in the form of a top dressing. About forty bushels to the acre, sown over grass lands, or among young plants, as turnips, it has been found will produce an increased yield. Wherever an increased supply of ammonia, escaping from the air, the earth, or any putrescent matter is desirable to be caught and retained, charcoal will always do good. But the best, and perhaps the only advisable mode of using charcoal is, to compost the powder with night soil, urine, blood, and other putrescent bodies, either liquid or solid. By this method, it tends to absorb or dry up these fluids, and retain the ammonia formed during their decomposition or decay. Such composts, when added to the soil, retain the virtue of these bodies much longer than when they are used alone.



KENDALL'S CHEESE PRESS.

CHEESE. In rural economy, is composed of coagulated milk, which has undergone a chemical process, combined with the mechanical operation of a powerful press, usually employed to expel the serum or whey, which would otherwise retain it in a nearly fluid state, and as such produce decomposition. The quality, and as such the value, of cheese generally depends on the nature of the milk employed, which varies considerably in different places. There is likewise a kind of medicated cheese made by intimately mixing the express juice of certain herbs, as sage or mint, with the curd, before it is formed

into a cheese. The Laplanders manufacture a species of cheese of the milk of their reindeer which is not only of great service to them as food, but also for a variety of other purposes connected with domestic economy.

CHEMISTRY. Is an instructive, interesting and valuable science. Within the last hundred years its empire has been wonderfully extended. There is scarcely an art of human life which it is not fitted to subserve; scarcely a department of human inquiry or labor, either for health, pleasure, ornament, or profit, which it may not be made in its present improved state, eminently to promote. To the husbandman this science furnishes principles and agents of inestimable value. It teaches him the food of plants, the choice and use of manures, and the best means of promoting the vigor, growth, productiveness, and preservation of the various vegetable tribes. To the manufacturer chemistry has lately become equally fruitful of instruction and assistance. In the arts of brewing tanning, dyeing, and bleaching, its doctrines are important guides. In making soap, glass, pottery, and all metallic wares, its principles are daily applied, and are capable of a still more useful application, as they become better understood. Indeed, every mechanic art, in the different processes of which heat, moisture, solution, mixture, or fermentation is necessary, must ever keep pace in improvement with this branch of philosophy. To the physician this science is of still greater value, and is daily growing in importance. He learns from it to compound his medicines, to disarm poisons of their force, to adjust remedies to diseases, and to adopt general means of preserving health.

Finally, to the domestic economist this science abounds with pleasing and wholesome lessons. It enables him to make a proper choice of meats and drinks; it directs him to those measures with respect to food, clothing, and respiration, which have the best tendency to promote health, enjoyment, and cheapness of living; and it sets him on his guard against many unseen evils, to which those who are ignorant of its laws are continually exposed. In a word, from a speculative science, chemistry, since the middle of the eighteenth century, has become eminently and extensively a practical one. From an obscure, humble, and uninteresting place among the objects of study, it has risen to high and dignified station; and instead of merely gratifying curiosity, or furnishing amusement, it promises a degree of utility, of which no one can calculate the consequences or see the end.

The object of chemistry is to ascertain the ingredients of which bodies are composed,—to examine the compounds formed by those ingredients,—and to investigate the nature of the power which produces these combinations. The science therefore naturally divides itself into three parts; a description of the component parts of bodies, or of *elementary* or simple substances as they are called—a description of the compound bodies formed by the union of simple substances—and

an account of the nature of the power which produces these combinations.

CHERRY. There are two kinds of the cherry tree which are of considerable importance ; the first, the wild or black cherry of our forests, is much valued for the excellence of its wood, which is used extensively for the manufacture of furniture. It is one of the most beautiful of our forest trees, throwing up a tall straight trunk, from six to nine feet in circumference, some seventy or eighty feet. While the use of liquor was more tolerated and fashionable than at present, the cherries of this tree were in great demand, to be steeped in rum. The other kind of cherry is the cultivated variety, and is one of our most valuable fruit trees, easily grown, very hardy, and early in the season. Cherries flourish best in a dry and rather light soil ; and a heavy wet or clay soil is not only injurious to the tree, but the fruit on such trees is of an inferior quality. *For the varieties of this fruit see Cole's American Fruit Book.*

CHESTNUT TREE. A tree that is common in the United States, and highly valuable both for its timber and fruit ; it sometimes grows to a prodigious size. In the Gentleman's Magazine, of 1770, we are told of a Spanish chestnut, measuring fifty-seven feet in circumference, which grows in Gloucestershire in England. It is supposed by Evylin and Bradley to have been planted in the reign of king John, from mention of it in records of that antiquity ; and if so, it must have been about six hundred years old. According to Dr, Howel, the famous chestnut tree of Mount Etna is one hundred and sixty feet in circumference, but quite hollow within ; which, however affects not its verdure ; for the chestnut tree, like the willow, depends upon its bark for subsistence, and by age loses its internal part. In the cavity of this tree the people have constructed a commodious house, which they use for various purposes ; it is called *the tree of a hundred horses*, as so many may at one time be shelterd under its boughs. The wood of the chestnut tree (says St. Pierre) is never attacked by insects, and is excellent for wainscoting. A judgment (he adds) may be formed of the beauty and of the duration of its wood, from the ancient wainscoting of the market of St. Germain, in France ; of which the joists are of a prodigious length and thickness, perfectly round, though more than four hundred years old.

CHIMNEY. In architecture, a particular part of a house, where the fire is made, having a tube or funnel to carry off the smoke. The effect of chimneys is often destroyed by their being constructed on unscientific principles. It will be found for the most part that the smoking of chimneys arises from their being carried up narrower at the top than at the bottom, and from their being thrown in a zigzag direction. Now it is evident from the very principle on which smoke rises at all in a chimney, that the higher it rises the less is the force that drives it, and the slower it must move, and consequently the

more room it should have to move in, whereas in the usual way it has less. Chimneys, therefore, should be built as nearly perpendicularly as possible ; they ought to be free from all roughness on the inside ; and a few inches wider at the top than at the base. This would effectually prevent smoking ; and might be so managed as not to interfere with the form of the exterior.

CHINA PAPER. The Chinese, for making paper, use the bamboo reed, the cotton shrub, the bark of the *kou-chee*, and of the mulberry tree ; also hemp, the straw of wheat and rice, the cods of the silkworm, and several other substances, the greater part of which are unknown in this manufacture in Europe. Most of the Chinese paper is very susceptible of moisture ; dust easily adheres to it, and worms insensibly get into it ; but their paper is much superior to ours in softness, smoothness, and the extraordinary size of the sheets ; it being no difficult matter to obtain, from certain manufactories, sheets thirty or forty feet in length.

CHINCHILLA. This interesting animal, which produces the well known fur passing under that name, is a species of Field Mouse, and is common in the high plains of Chili and Peru. It is about nine inches in length, and has a tail about half the length of its body. It sits upon its haunches, and takes its food in its paws like a squirrel. It feeds chiefly upon bulbous roots.



CHINESE GOOSE.

CHINESE GOOSE. Only a few of the varieties of the goose family have been brought from China to the United States. The cut represents one of them which belonged to Mr. C. N. Bement. The form of these is very handsome ; their necks are long, with a

graceful curve ; their bodies round, and the bill rises in a knob ; a characteristic of all the Asiatic goose-tribe, so far as we know ; and both the bill and the legs are black. Their general color is almost as uniform as that of our American wild geese ; and their flesh is said to be very excellent. At the Agricultural Fair held at Poughkeepsie, N. Y., in 1844, fine specimens of the Chinese goose were exhibited, belonging to A. & H. Messier, of Fishkill. In the August following, the talented editor of the Albany Cultivator visited the farm of these gentlemen, where he saw their entire flock of these geese. He says it was the finest exhibition of them that he ever beheld ; that there were three or four broods of goslings, hatched in May, but grown up, apparently as large as the old ones ; and the geese which hatched them were all sitting for a second brood, which were expected to be out the first of September.

CHINESE AGRICULTURE. The pursuits of agriculture have always been and still are held in high estimation by the Chinese, who commence the agricultural year with a grand festival in honor of spring. On this occasion the emperor, in imitation of his ancient predecessor, performs the operation of ploughing and sowing seed in a field set apart for that purpose, a custom that has very seldom been neglected by the sovereigns of the Chinese Empire, who have thus by their own example, stimulated their subjects to the performance of these useful and necessary labors, and maintained the honorable position and character of the husbandman, who even now holds a rank in society above that of the soldier or merchant, however wealthy the latter may be.

Among the ancients, particularly the Egyptians, Persians, and Greeks, it was a common practice to hold games and festivals, mingled with religious ceremonies, at that season when the earth is ready to receive the seed, thus showing the cheerfulness with which the farmers returned to their rustic toils, and the reliance they placed on the Supreme Being to reward them with an abundant harvest. The old festival of Plough Monday in England, was probably derived from these customs of the ancients, and was formerly celebrated in all of the rural districts with great merry-makings on the Monday following the twelfth-day ; some of the rites observed being not unlike those among the Chinese, as an instance of which the plough-light was set up before the image of some patron-saint in the village church ; a custom somewhat similar to that observed among the Chinese, who place lighted candles opposite certain images in their temples.

The plough, the harrow, and the hoe, all of the rudest construction, are the chief implements used by a Chinese farmer, the spade being only seen occasionally. The plough is usually drawn by buffaloes, but sometimes that labor is performed by men, and even by women, among the lowest class of farmers. The great object of cultivation is rice, the staple food of all classes, from the prince to the

peasants. Most of the plains present an endless succession of rice or paddy fields, which, in the early stages of the crops, exhibit a vast surface of bright green, but turn yellow as the grain ripens. The seed is first sown in small patches, flooded with a particular preparation of liquid manure, which promotes its immediate development, so that in a few days the shoots are five or six inches in height, when they are transplanted to the fields, some of the laborers being employed in taking them up, others in making holes to receive them, and a third party in dropping them into the holes, about six together. All these men stand up to the ankles in water, for it is requisite that rice should be kept constantly wet, or it would be spoiled; but when the rice is ripe, the fields are drained, so that the reapers, whose labors commence about midsummer, work on dry ground.



CHINESE HOG.

CHINESE HOG. The Chinese is among the smaller varieties, and without doubt is the parent stock of the best European and American swine. They necessarily vary in appearance, size, shape, and color, from the diversity in the style in breeding, and the various regions from which they are derived. The animal is too small for general use, and it requires to be mixed with larger breeds to produce the most profitable carcase, especially for the market. For the purpose of refining the coarse breeds, no animal has ever been so successful as this. They are fine-boned, short, and very compact, with

bellies almost touching the ground, light head and ears, fine muzzle, of great docility and quietness, small feeders, and producing much meat for the quantity of food consumed.

CHOCOLATE. A kind of cake or confection, prepared of certain drugs; the basis or principal whereof is the *cocoa-nut*. The Spaniards were the first who brought chocolate into use in Europe; and that, perhaps, as much out of interest, to have the better market for their cocoa-nuts, vanilla, and other drugs which their West Indies furnish, and which enter the composition of chocolate, as out of regard to those extraordinary virtues which their authors so amply enumerate in it.

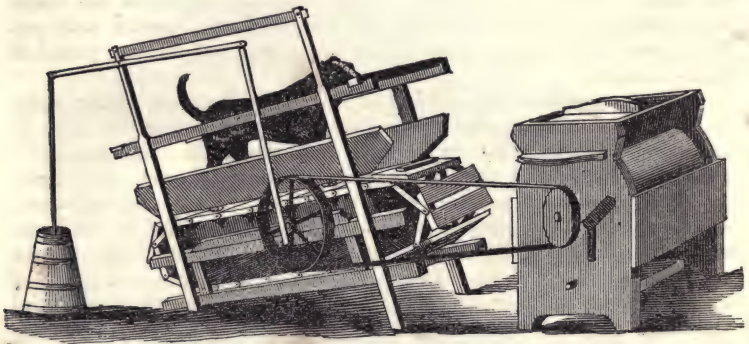
The method first used by the Spaniards was very simple, and the same with that in use among the Indians; they only used cocoa-nuts, maize, and raw sugar as expressed from the canes, with a little achiotte, or roucon, to give it a color; of these four drugs, ground between two stones, and mixed together in a certain proportion, they made a kind of bread, which served them equally for solid food, and for drink; eating it dry when hungry, and steeping it in hot water when thirsty. The Indians, to one pound of the roasted nuts, put half a pound of sugar, dissolved in rose-water, and half a pound of flour of maize.

The Spaniards esteem it the last misfortune that can befall a man, to be reduced to want chocolate; they are never known to leave it, excepting for some other liquor that will intoxicate. Hoffman considers chocolate as an aliment, and, in a medicinal view, he recommends it in emaciating diseases, both as an aliment and medicine; and next very strenuously in hypochondriacal cases; and in confirmation, adduces that of Cardinal Richelieu, who, he says, was restored to health by living on chocolate. He is not less copious on its good effects against the hæmorrhoids. The newest chocolate is esteemed the best; the drug never keeping well above two years, but usually degenerating much before that time.

CHRYSLIS. In natural history, a state of rest and seeming insensibility which butterflies, moths, and several other kinds of insects, must pass through before they arrive at their winged or most perfect state. The first state of these animals is in the caterpillar or reptile form; then they pass into the chrysalis state, wherein they remain, immovably fixed to one spot, and surrounded with a case or covering, which is generally of a conical figure; and, lastly, after spending the usual time in this middle state, they throw off the external case wherein they lay imprisoned, and appear in their most perfect and winged form of butterflies, or flies.

CHURN. An implement for agitating cream or milk, so as to effect the production of butter. Some churns are made upright, of a tapering form, and are worked by means of a pole and cross; the former passing through a hole in the lid. These are pail or bell-

churns. A great variety of churns are in use ; but, in general, their formation evinces more ingenuity than practical knowledge. Perhaps the horizontal churns, and also the upright ones, operated with a crank by hand, are an exception to this remark ; and, where there is a large number of cows, whether the entire milk or the cream only is to be churned, what is called the dog-power applied to the churn, is an important saving of manual labor. And there has recently been invented, by F. G. Simpson, of New Jersey, a churn to be operated by machinery with a weight applied, similar to the running of a clock. Nothing is required but to put the milk or cream into the churn, and then wind up the machinery, when the moderate and uniform agitation of the liquid is begun and continued till butter is produced, without the aid of any other power. Thus far this invention works well ; and if no difficulty hereafter arises in its use, it will be generally adopted wherever the labor heretofore required in churning has been found a great burden.



DOG-POWER CHURN.

CIDER. This is the expressed and fermented juice of apples. To produce good cider, it is necessary that the fruit should be ripe, that it should be sound, that it should be all of one kind, and that there should be a perfect grinding of the apples. If the apples are not ripe, the saccharine matter necessary to make a good fermented liquor is not developed ; rotten apples impart an unpleasant flavor to the liquor ; and different kinds of apples afford a liquor that will not ferment equally or perfectly. When the liquor is pressed from the pomace, it should be put in sweet, clean barrels, allowed to ferment, and filled up occasionally, that all the feculent matter may escape. It may be fined by isinglass, or drawn off for bottling. Where making good cider is an object with the farmer, it is usually racked off after the fermentation is closed, and time allowed for all sediments to

leave the liquor, into clean new barrels fumigated with sulphur, and will then keep good for a considerable length of time.

Cider was formerly used extensively for distillation into apple brandy, but is now but little used for that purpose. According to Brande's analysis of fermented liquors, wines contain from 25 to 10 per cent. of alcohol, and cider from 10 to 5 per cent. Cider makes an excellent vinegar, and large quantities are consumed for that purpose. The best cider made in the United States is produced in New Jersey, owing, probably, to the skill in manufacturing, more than to any peculiar excellence of fruit or singularity of the soil or climate.

CINNAMON. This well known spice is the bark of the *Laurus cinnamomum*, which is cultivated both in the Spice Islands and at Cayenne, though most abundantly in the former, whence almost the whole of the cinnamon for the European market is brought. Captain Percival has given the fullest account of this plant that has ever met our eye, and the following account is substantially derived from his history of Ceylon. The cinnamon gardens are within half a mile of the fort of Columbo in Ceylon. They extend over a surface of more than fifteen miles, which is traversed by various roads. There are also plantations of the shrub at Madeira, and Point de Galle. It thrives best in a loose white sand. It has a slender trunk, rises to the height of from four to ten feet, innumerable branches shoot from the stem, and give it the appearance of the Portugal laurel. The wood is light and porous, like that of the osier. It is used as fuel. Shoots spring up from the roots in immense profusion. The leaves, when they first burst, have a beautiful scarlet color; they then become green, and have both the taste and smell of cloves. The blossom is white, and has no smell. The fruit resembles an acorn.

It is ripe at the end of autumn, when oil is obtained by bruising and boiling it. The natives anoint themselves with oil, which is skimmed off, and they also mix it with cocoa nut oil, and burn it in lamps. During all audiences with the sovereign of Candy, this oil is burnt. When the trees become too old, they are cut down, and their places are soon occupied by young shoots, that rise from the roots in vast profusion. Formerly, many of these young twigs were cut as sticks, which are highly prized; but this is now prohibited.

The branches which are three years old are lopped off; the epidermis is scraped off with a knife, having one side concave, and the other convex; the true bark is then ripped up, loosened by the convex side of the knife, and separated from the wood. The smaller portions are then put into the larger. They are then dried in the sun. When the drying is complete, the cinnamon is packed into bundles, which weigh about thirty pounds. These bundles are bound with bamboo twigs. They are then marked and numbered.

When the cinnamon is brought to Columbo, previous to its shipment for Europe, it is examined by the surgeons in the Company's

service in rotation ; and this is a most painful duty, as the only test is the taste. The continued chewing of this pungent substance, excoriates the mouth in spite of the utmost precaution. Experience has shown, that the evil effects of the chewing is best alleviated by occasionally eating bread and butter.

CISTERN. Is properly used for a subterraneous reservoir of rain-water. Earthen cisterns must be made with good cement, to retain the water, and the bottom should be covered with sand to sweeten and preserve it. Authors mention a cistern at Constantinople, the vaults whereof are supported by two rows of pillars, two hundred and twelve in each row, each pillar being two feet in diameter. They are planted circularly, and in radii tending to that in the centre.

Anciently there were cisterns all over the country in Palestine. There were some likewise in cities and private houses. As the cities for the most part were built on mountains, and the rains fell regularly in Judea at two seasons of the year only, in spring and autumn, people were obliged to keep water in cisterns in the country, for the use of their cattle ; and in cities for the conveniency of the inhabitants. There are cisterns of very large dimensions to be seen at this day in Palestine, some of which are a hundred and fifty paces long, and fifty-four wide. There is one to be seen at Ramah of two and thirty paces in length, and eight and twenty in width. Wells and cisterns, fountains and springs, are generally confounded in the Scripture language.

To farmers, not having springs or running water on their premises, it is very important to be provided with cisterns. In seasons of drought, especially, this will be a great convenience. On every farm with customary barns and out buildings, it would be easy to fill cisterns containing from two to three hundred hogsheads. In a single rain from the dwelling-house alone, we have collected over twenty hogsheads. Such is not a common occurrence. However, the quantity that may be saved in the year is surprisingly large ; probably enough for a stock of cattle, and for all domestic purposes, and even to water a common garden, when suffering from want of summer rains. Most of the materials for cisterns may be had on a farm, so that the expense in making them is not great. Stones are as good as brick. They will pay for themselves in a few years.

CLARIFICATION. This is the separation, by chemical means, of any liquid from substances suspended in it, and rendering it turbid. If a difference can be made between clarification and filtration, it is, that the latter is affected by mere mechanical means, but the former either by heat or by certain additions, the action of which may be considered as chiefly chemical. The liquors subjected to clarification are almost without exception those animal or vegetable juices, in which the matter that renders them turbid is so nearly of the same

specific gravity with the liquor itself, that mere rest will not effect a separation. In these, too, the liquor is generally rendered thicker than usual by holding in solution much mucilage, which further entangles the turbid matter, and prevents it from sinking. Hence it is that vinous fermentation has so powerful an effect as a clarifier, since this process always implies the destruction of a portion of saccharine mucilage, and the consequent production of a thin limpid spirit.

Coagulating substances are great clarifiers when mixed with any turbid liquors, the process of coagulation entangling with it all matters merely suspended and not dissolved, and carrying them either to the top in the form of a scum, or to the bottom in the form of a thick sediment, according to circumstances. Thus, to clarify muddy cider, the liquor is beaten up with a small quantity of fresh bullock's blood, and suffered to stand at rest for some hours, after which the liquor above is as clear as water, and almost as colorless, and at the bottom is a thick tough cake, consisting of the coagulated blood which has carried down with it all the opaque matter suspended in the liquor. Albuminous and gelatinous substances act in the same manner. The effect of white of an egg in this way is known to every one. It should be first mixed with the turbid liquor, without heat and by agitation. Afterwards, on applying less than a boiling heat, the albumen of the egg coagulates, and carries up with it all the opaque particles, leaving the rest beautifully clear and limpid. Sometimes clarification takes place in a very unaccountable manner. Thus, it is well known, that a handful of marl or clay will clarify a large cistern of muddy water, and marl is also used with advantage in clarifying vinous liquors.

CLAY. There is a great variety of earths or clays denominated after the particular use to which they are applied, as Porcelain Clay, which consists of alumina and silix, with a little mica, and is found in Cornwall, Saxony, Japan, and China. It is of a reddish white, is supposed to be formed from the decomposition of felspar, and is used in the manufacture of porcelain or china. Pipe Clay is of a greyish or yellowish white. Potters' Clay is found of various shades of yellow, grey, green, and blue. The most durable kind of bricks are made of a Yellow Clay containing some iron, and a considerable portion of silix.

Next to silicia, common clay is the most abundant of the earths, and is of extensive service to the agriculturist. Indeed without its presence, vegetation would scarcely be possible, and cultivation could not exist. To the presence of clay we owe the capacity of soils to retain moisture in any degree, since the other earths would leave it so porous, that water would pass through it as readily as through a sieve. Mixed with lime, clay constitutes marl, of which such use is already made in fertilising the soil, where these ingredients appear to

be wanting. On soils so sandy as to be porous, the application of manures produces only a partial good, it soon sinks beyond the reach of the roots of the plants. It is on these that clay may be applied directly with excellent effect.

CLIMATE. We understand by climate the metereological peculiarities of any location, whether of heat or cold, moisture or drought, and pestilential or salubrious atmospheric influences. Heat or cold do not depend altogether on geographical position; there are numerous causes that tend to increase or decrease these, such as oceans, mountains, plains, local or general currents of air, and others that will at once present themselves, as influencing climate in these respects. The western side of continents is found warmer than the eastern side, a fact accounted for by the general prevalence of westerly winds, which in their passage over oceans are raised in their temperature, while winds that pass over land for the same distance are usually cooled in the same degree. Thus the coast of the United States that borders on the Pacific Ocean is altogether warmer than the eastern or Atlantic coast, the territory at the mouth of the Columbia, which is in the latitude of Mackinaw and Montreal, having the climate, and producing the same vegetables, as the Carolinas and Georgia. On the different sides of the Atlantic, too, it is found the same difference prevails; places having the latitude of Quebec, in western Europe, producing the grains and plants of Pennsylvania and Maryland.

The elevation of any country above the sea has also a decided effect on the climate. Thus under the equator, in ascending high mountains, the temperature and the climate of widely different regions may be passed in a few miles or hours. The clearing of a country has also a great effect on climate; as forests prevent speedy evaporation, and retain the water that falls on the surface. All other circumstances being equal, a cleared country is warmer than a wooded one. The Cape Verd Islands, by being deprived of their woods, have become sultry, the springs have mostly dried up, and the health of the inhabitants seriously affected. Is it not probable that many eastern countries, once fertile and filled with inhabitants, have become wastes, if not actual deserts, in consequence of the face of the earth having for centuries been wholly denuded of wood? The great lakes of this country, containing as they do about one-half the fresh water on the globe, and from their great depth only slowly feeling the influence of the atmosphere, whether in cooling or heating, have, perhaps, more influence over the climate of the countries bordering on them, than any other single cause.

CLOCK This is a machine moving by a pendulum, serving to measure time, and to show the hours by striking on a bell. Al-Raschid, an Arabian ambassador, brought into France, in the year 802, a striking clock, the first ever seen in that kingdom. At that time,

the Arabs were much superior to the French and other Europeans, in knowledge, and in the arts. Huggins was the first person who brought the art of clock making to any perfection ; and the first pendulum clock made in England, was in the year 1662, by Fromantil, a Dutchman, The expense of a clock was formerly so great, a few only could own one ; but latterly they are manufactured with such speed no one need be without an article so convenient for domestic economy and for labor generally. The following facts respecting the multiplication of clocks cannot be without interest.

It is said there was resident in the town of Bristol, Conn., a single clock-maker, who patiently wrought out time pieces by hand, at an expense of sixty or seventy dollars each. About the year 1815, some individuals, stimulated by the industry of the solitary clock-maker, set up the business of making wooden clocks. This article went all over the United States, and brought rich returns to the inventors. When the market was supplied with these, cheap brass clocks were made by machinery, which could be afforded as low as two or three dollars each. The business of making clocks by machinery, has been set up in at least twenty other towns in Connecticut ; and the whole world is now their customers. On the authority of Fraser's Magazine, it is asserted that every hall and cottage in England is furnished with one of them.

CLOTHING. Nothing is more necessary to a comfortable state of existence than that the body should be kept in nearly a uniform temperature. The chief end proposed by clothing ought to be protection from the cold ; and it never can be too deeply impressed on the mind, that a degree of cold that amounts to shivering cannot be felt, under any circumstances, without injury to the health, and that the strongest constitution cannot resist the benumbing influence of a sensation of cold constantly present, even though it be so moderate as not to occasion immediate complaint, or to induce the sufferer to seek protection from it. This degree of cold often lays the foundation of the whole host of chronic diseases, foremost amongst which are found scrofula and consumption.

The only kind of dress that can afford the protection required by the change of temperature to which high northern climates are liable, is woollen. Nor will it be of much avail that woollen be worn unless so much of it be worn, and it be so worn, as effectually to keep out the cold. Those who would receive the advantage which the wearing of woollen is capable of affording, must wear it next the skin ; for it is in this situation only that its health-preserving power can be felt. The great advantages of woollen cloth are briefly these : The readiness with which it allows the escape of the matter of perspiration through its texture ; its power of preserving the sensation of warmth to the skin under all circumstances ; the difficulty there is

in making it thoroughly wet; the slowness with which it conducts heat; the softness, lightness, and pliancy of its texture.

Cotton cloth, though it differs but little from linen, approaches nearer to the nature of woolen, and, on that account, must be esteemed as the next best substance of which clothing may be made. Silk is the next in point of excellence, but it is very inferior to cotton in every respect. Linen possesses the contrary of most of the properties enumerated as excellences in woolen. It retains the matter of perspiration in its texture, and speedily becomes imbued with it; it gives an unpleasant sensation of cold to the skin; it is very readily saturated with moisture, and it conducts heat too rapidly.

CLOTH TREE. A remarkable and very useful tree growing in the Sandwich Islands: the natives call it *Touta*. Of the bark of this tree, neatly twisted, they form the twine which they use for fishing lines, for making nets and for some other uses. It is of different degrees of firmness, and may be continued to any length. They have also a finer sort, which they make of the bark of a shrub named *areemah*; and they make a cordage of a stronger kind, from cocoa-nut fibres, for the rigging of their canoes.

CLOUDS. A collection of vapor suspended in the atmosphere. In other words, it is a congeries of watery particles raised from the waters, or watery parts of the earth, by the solar or electrical fire. These watery particles, in their first ascent, are too minute, and too much separated by their mutual repulsion, to be perceived; but as they mount higher and higher, meeting with a greater degree of cold, losing their electricity, or by some process employed by Nature for this purpose, they are in a certain degree condensed, and rendered opaque, by the reunion of their parts, so as to reflect and absorb light, and become visible as clouds.

The lowest part of the air being pressed by the weight of the upper against the surface of the water, and continually rubbed upon it by its motion, attracts and dissolves those particles with which it is in contact, and separates them from the rest of the water. And since the cause of solution is the stronger attraction of the particles of water towards the air than towards each other, those that are already dissolved and taken up will be raised still higher by the attraction of the dry air, which lies over them, and thus will diffuse themselves, rising gradually higher and higher, thereby leaving the lower air not so much saturated, but that it will still dissolve and take up fresh particles of water; which process is greatly promoted by the motion of the wind.

When the vapors are thus raised into the higher and colder parts of the atmosphere, some of them will coalesce into small particles, which, slightly attracting each other, and being intermixed with air, will form *clouds*; and these clouds will float at different heights, according to the quantity of vapor borne up, and to the degree of heat

in the upper part of the atmosphere. The clouds, therefore, are generally higher in summer than in winter; in the former season they are from one mile to three miles high, and in the latter from a quarter of a mile to a mile.

When the clouds are much increased by a continual addition of vapors, and their particles are driven close together by the force of the winds, they will run into drops heavy enough to fall down in *rain*. If the clouds are frozen before their particles are gathered into drops, small pieces of them being condensed, and made heavier by the cold, they fall down in flakes of *snow*. If the particles are formed into drops before they are frozen, they become *hailstones*. When the air is replete with vapors, and a cold breeze springs up which checks the solution of them in the air, clouds are formed in the lower parts of the atmosphere, and these compose a *mist* or *fog*; this usually happens in a cold morning; but the mist is dispersed when the sun has warmed the air, and made it capable of dissolving the watery particles of which the mist is composed.

Southerly winds generally bring rain, because, being commonly warm, and replete with aqueous vapors, they are cooled by passing into a colder climate; and therefore part with some of them, and suffer them to precipitate in rain; northerly winds, on the contrary, being cold, and acquiring heat by coming into a warm climate, take up or dissolve more vapor than they before contained; and therefore are dry and parching, and usually attended with fair weather.

Every farmer whose business is in the open air, is more or less a meteorologist; and none find an acquaintance with the clouds, and the power of judging of the future by their present appearances, of more essential service than the farmer. In assisting to form a correct decision with regard to the weather, a barometer is of great help; but where such an instrument is not at hand, the clouds, by their different structure, height, and density, will enable the scientific or even the ordinary observer, to calculate quite accurately the results of their appearance. It is proverbial how accurately mariners may judge of approaching changes in the weather. Farmers may acquire much of a similar accuracy.

CLOVE. The clove is the unexpanded flower-bud of an East Indian tree, somewhat resembling the laurel in its height, and in the shape of its leaves. In the Molucca islands, where the raising of different spices was formerly carried on by the Dutch colonists to great extent, the culture of the clove-tree was a very important pursuit. It has even been asserted, that, in order to secure a lucrative branch of commerce in this article to themselves, they destroyed all the trees growing in other islands, and confined the propagation of them to that of Ternate. But it appears that, in 1770 and 1772, both clove and nutmeg-trees were transplanted from the Moluccas into the islands of France and Bourbon, and subsequently into some of the colonies of

South America, where they have since been cultivated with great success. At a certain season of the year, the clove-tree produces a vast profusion of flowers. When fresh gathered, cloves will yield, on pressure, a fragrant, thick, and reddish oil; and, by distillation, a limpid essential oil. Oil of cloves is used by many persons, though very improperly, for curing the toothache; since, from its pungent quality, it is apt to corrode the gums and injure the adjacent teeth. When the tooth is carious, and will admit of it, a bruised clove is much to be preferred.

CLOVE TREE. A tree about twenty feet in height, bearing the aromatic fruit called clove; this tree has grown in greatest abundance in *Ternate*, an island of the Indian Ocean, being the principal of the Moluccas, or Spice Islands. In this island, which has been long celebrated for its beauty and healthfulness, the clove trees grew in such plenty, that they in some measure lessened their own value. For this reason the Dutch resolved to cut down the forests, and thus to raise the price of the commodity. But they soon had reason to repent of their avarice; for such a change ensued by cutting down the trees, that the whole island, from being healthy and delightful, having lost its charming shades, became extremely sickly, and has actually continued so to this day.

COACH. A vehicle for commodious travelling, suspended on leathers, and moving wheels. In England, and throughout Europe, the coaches are drawn by horses, except in Spain, where they use mules. In a part of the East, especially the dominions of the great Mogul, their coaches are drawn by oxen. In Denmark they sometimes yoke reindeer in their coaches; though this is rather for curiosity than use. The coachman is ordinarily placed on a seat raised before the body of the coach. But the Spanish policy has displaced him in that country by a royal ordinance; on occasion of the duke d'Olivares, who found that a very important secret, whereon he had conferred in his coach, had been overheard and revealed by his coachman; since that time the place of the Spanish coachman is the same with that of the French stage-coachman, *viz.* on the first horse on the left.

COAL. Coal of greater or less quantities, and of different qualities, is found in most countries—in Holland, Germany, Saxony, Portugal, Switzerland, Sweden, China, Japan, New Holland, and in North and South America. Buffon states, that in his time, there were no less than four hundred collieries worked in France. The deepest mine in the world is near Namur; it is stated to be two thousand four hundred feet, or nearly half a mile, in depth. Coal is seldom found on high mountains, but usually, the localities are in hilly situations, most commonly under a stratum composed of sand clay, or argillite, splitting into layers, forming either slates, or a substance called *shivers*, according to its fracture. Coal is found on hills in

strata, from a few inches to some feet in thickness, alternating with strata of grit-stone and argillite. The beds run in various directions, generally inclined to the horizon, which is called *the dip*. They are frequently intercepted by columns of other matter; and the continuation of the bed may be higher or lower than the part from which it seems to have been separated.

Geology has proved that, at one period, there existed an enormously abundant land vegetation, the ruins or rubbish of which, carried into seas, and there sunk to the bottom, and afterwards covered over by sand and mud beds, became the substance which we now recognize as coal. This was a natural transaction of vast consequence to us, seeing how much utility we find in coal, both for warming our dwellings and for various manufactures, as well as the production of steam, by which so great a mechanical power is generated. It may naturally excite surprise that the vegetable remains should have so completely changed their apparent character, and become black. But this can be explained by chemistry; and part of the marvel becomes clear to the simplest understanding when we recall the familiar fact, that damp hay, thrown closely into a heap, gives out heat, and becomes of a dark color.

When a vegetable mass is excluded from the air, and subjected to a great pressure, a bituminous fermentation is produced, and the result is the mineral coal, which is of various characters, according as the mass has been originally intermingled with sand, clay, or other earthy impurities. On account of the change effected by mineralization, it is difficult to detect in coal the traces of a vegetable structure; but these can be made clear in all except the highly bituminous caking coal, by cutting or polishing it down into thin transparent slices, when the microscope shows the fibre and cells very plainly.

From distinct isolated specimens found in the sand-stones amidst the coal beds, we discovered the nature of the plants of this era. They are almost all of a simple cellular structure, and such as exist with us in small forms, (horse tails, club mosses, and frens,) but advanced to an enormous magnitude. The species are all long since extinct. The vegetation generally is such as now grow in clusters of tropical islands; but it must have been the result of a high temperature, obtained otherwise than that of the tropical regions now is, for the coal strata are found in the temperate, and even the polar regions.

The conclusion, therefore, to which most geologists have arrived is, that the earth, originally an incandescent or highly heated mass, was gradually cooled down, until in the Carboniferous period it fostered a growth of terrestrial vegetation all over its surface, to which the existing jungles of the tropics are mere barrenness in comparison. The high and uniform temperature, combined with greater proportion of carbonic acid gas in the manufacture, could not only sustain a gigantic and prolific vegetation, but would also create dense vapors,

showers and rains ; and these again, gigantic rivers, periodical inundations, and deltas. Thus all the conditions for extensive deposits of wood, in estuaries, would arise from this high temperature ; and every circumstance connected with the coal measures points to such conditions.

COFFEE. A seed, or berry, brought originally from Arabia Felix, used for making a drink of the same nature. By coffee we usually mean the drink itself, prepared from those berries. Its origin is not well known ; some ascribe it to the prior of a monastery, who, being informed by a goatherd that his cattle, sometimes browsing on this tree, would wake and caper all night, became desirous of proving its virtue ; accordingly he first tried it on his monks, to prevent their sleeping at matins. Others refer the invention of coffee to the Persians, from whom it was learned in the fifteenth century, by a mufti of Aden, a city near the mouth of the Red Sea ; and who, having tried its virtues himself, and found that it dissipated the fumes which oppress the head, inspired joy, opened the bowels, and prevented sleep without his being incommoded by it, recommended it first to his dervises, with whom he used to spend the night in prayer. Their example brought coffee into fashion at Aden ; there the professors of the law, for study, artisans to work, travellers to walk in the night, in short, almost every person drank coffee. Thence it passed to Mecca, and from Arabia Felix to Cairo, and from Egypt to Syria and Constantinople. Thevenot, the traveller, was the first who brought it into France ; and a Greek servant, called Pasqua, brought it into England in 1652, and setting up the profession of coffee-man, first introduced the drink among the English ; though some say Dr. Harvey had used it before.

COFFEE TREE. This tree is a native of Arabia ; and though it thrives surprisingly in the Antilles, at Cayenne, and in the Isle of Bourbon, also in Jamaica, it has preserved in its original country a superiority that gives it a preference in all the markets of Europe. The fruit, when stripped of its skin, is commonly small and round ; it is of a green color, and has a strong scent. In rich and spongy soils, a single tree has been known to yield from six to eight pounds of coffee ; in different situations, a pound and a quarter from each tree is great yielding. An acre of ground will yield from three to seven hundred pounds of coffee. Some of our modern political economists affirm it may be raised in the southern portions of our own country ; but if, on trial, such should be the fact, it is doubted whether it can ever here be made a profitable crop.

COLD. When caloric combines with our bodies, or separates from them, we experience, in the first case, the sensation of heat, in the second, cold. When the hand is put upon a hot iron, part of the caloric leaves the iron, and enters the hand ; this produces the sensation of heat. On the contrary, when the hand is put upon a lump of

ice; this produces the sensation of cold. The sensation of heat is occasioned by caloric passing into our bodies; the sensation of cold by caloric passing out of our bodies. We say that a body is hot, when it communicates caloric to the surrounding bodies. We call it cold, when it absorbs caloric from other bodies.

COLORS. The different hues in which bodies appear to the eye. The colors which are most grateful and refreshing to the sight, are blue and green; and hence our all-bountiful Creator has clothed the heavens and the earth, those expansive and general objects of vision, with these colors. The Turks prefer green to every other color; because, according to the tradition of their theologians, this was the favorite color of Mahomet; and his descendants alone, of all the Turks, have the privilege of wearing the green turban. Yellow is in China the imperial color, as green is in Turkey. The most beautiful of all colors in the judgment of most nations, is red. The Russians, when they would describe a beautiful girl, say she is red; red and beautiful, being with them synonymous terms.

In Mexico and Peru, red was held in very high estimation. The most magnificent present which the emperor Montezuma could devise for Cortez, was a necklace of lobsters, which naturally have that rich color. The only demand made upon the Spaniards by the king of Sumatra, on their first landing in his country, and presenting him with many samples of the commerce and industry of Europe, was some corals and scarlet colored stuffs; and he promised to give them in return, all the spiceries and merchandise of India, for which they might have occasion. There is no such thing as carrying on trade to any advantage with the Negroes, the Tartars, and the East-Indians, but through the medium of red cloths. It is with red that nature heightens the most brilliant parts of the most beautiful flowers, and she invests most of the feathered race in India with a plumage of this color; some have their heads covered with it; others have a breast-plate of it, a necklace, a capuchin, a shoulder-knot.

COMPLEXION. The color of the skin, varying according to climate. The Europeans, when they settle in New Spain or the West India islands, soon lose their whiteness, and become of a brownish yellow. The Europeans who reside long in the East Indies, become of the same cream colored complexion. The Spaniards, who have inhabited America under the torrid zone for any considerable time, have become as dark colored as the native Indians of Virginia. The descendants of the Portugese, who settled at Senegal in Africa, in the year 1400, and of those who settled at Mitambo, and on the coasts of Congo, have the African color and woolly heads. The Jews who descended from one stock, and whose religion has prevented their marrying with other people, have varied in complexion according to climate. In Britain and Germany, they are white; in France and Turkey, they are brown; in Spain and Portugal, their

color is swarthy; in Syria and Chaldea, the olive color prevails; in Arabia and Egypt, they are of a tawny or copper color; and *Tudela*, a Jew, relates that his countrymen in Abyssinia had acquired the dark complexion of the original natives.

COMPOSTS. Animal manures, both solid and liquid, combined with earths and decaying vegetables, and indeed almost every substance of refuse from the domestic apartments of the farm, are called composts; and when the preparation of them is well managed, if there is in reality no increase of fertilizing agents, a far better quality of manures is obtained. Where the dung of the stables or the barnyard, is allowed to ferment before it is placed in the field, or in situations, where it is uncovered or unmixed with some substance to absorb and retain the gases generated, a great loss to the farmer of nutritive matter certainly ensues. To avoid this, and provide for a supply of fine manure, indispensable in gardening, and some other farm operations, it is found an excellent plan to mix the vegetable matters of swamps, the muck of drains, wash of roads, loam from the margin of fields, peat, and seemingly every thing of the kind in heaps with unfermented animal substances; and, in this way the insoluble part of the vegetable matter used, is prepared to become the food of plants, while they at the same time serve to prevent the escape of matter from the fermenting mass. The business of preparing composts is one of the most important in modern farming. The success of farming depends in no small measure upon it. No one till he has made a trial can be aware how much excellent manure a farmer can annually prepare by collecting in this way substances which are usually lost. The materials that may be used, and the processes for combining them is an important study. For assistance in this study and labor, every farmer should own some book on the subject. We think Browne's American Muck Book is the best.

CONDOR. The Condor possesses all the formidable qualities of the eagle, yet in a much higher degree; for it is not only an enemy to the bird and brute creation, but, when violently pressed with hunger, will make its attack upon mankind. Fortunately the species of this rapacious invader is scarce, or its depredations would be terrible indeed; for the Indians assert that it will carry off a deer or calf in its talons, with as much ease as an eagle will a lamb. When their wings are extended, they are said to measure eighteen feet across; though one, which was shot by a gentleman in Peru, which he measured with the greatest exactitude, was only twelve; the great feathers upon the wings were a beautiful shining black, measuring two feet four inches in length; those upon the breast and neck were of a light brown, and those upon the back were rather of a darker shade; a short down of the same color covered the head; the eyes were black, and surrounded with a circle of reddish brown; the beak was about four inches in length, hooked downwards, and the extremity white;

the thigh bone measured ten inches, the leg five, the toes three, and the claws near one; and both the legs and toes were covered with large scales.

COOKERY or COOKING. Dr. Cullen says that the cooking of vegetables by boiling renders them more soluble in the stomach, notwithstanding the degree of coagulation which their juices undergo. In the second place, the application of a boiling heat dissipates the volatile parts of vegetable substances, which are seldom of a nutritious nature, but in many cases, have a tendency to prove noxious. In the third place, boiling helps to extricate a considerable quantity of air that, in the natural state of vegetables, is always fixed in their substance; and it is probably in this way especially, that heat contributes to the dividing and loosening the cohesion of their smaller parts. Thus they are rendered less liable to ferment, and produce that flatulence which is so troublesome to weak stomachs.

The cookery of animal substances is of two kinds, as it is applied in humid form in boiling and stewing; or in a dry form, in roasting, broiling, and baking. By the joint application of heat and moisture to meat in boiling, the texture is certainly rendered more tender and more soluble in the stomach; and it is only in this way that the firmer parts, as the tendinous, ligamentous, and membranous parts, can be duly softened, and their gelatinous substances rendered subservient to nutrition. Yet these effects are different according to the degree of boiling. A moderate boiling may render their texture more tender without much diminution of their nutritious quality; but if the boiling be extended to extract every thing soluble, the substance remaining is certainly less soluble in the stomach, and at the same time much less nutritious. But as boiling extracts in the first place, the more soluble, and therefore the saline parts; so what remains is, in proportion, less alkaliescent, and less heating to the system.

Boiling in digesters, or vessels accurately closed, produces effects very different from boiling in open vessels. From meat cooked in the latter, there is no exhalation of volatile parts; the solution is made with great success, and if not carried very far, the meat may be rendered very tender, while it still retains its most sapid parts; and this is esteemed always the most desirable state of boiled meat. If a small quantity of water only is applied, and the heat continued long in a moderate degree, the process is called stewing, which has the effect of rendering the texture of meat more tender, without extracting much of the soluble parts. This, therefore, leaves the meat more sapid, and in a state perhaps the most nourishing of any form of cookery; as we learn from the admirable essays and experiments of Count Rumford, who found very unusual effects produced on meat, by a low degree and long-continued action of heat, both in the dry and humid way.

The application of a dry heat in the cookery of meat is of two

kinds, as it is carried on in close vessels, or as it is exposed to the air. The first of these which we shall consider is baking. In this practice meat has generally a covering of paste, by which any considerable exhalation is prevented, and the retention of the juices renders the meat more tender. In all cases, when the heat applied loosens, and in some measure extricates the air, without exhaling it, the substance submitted to this process is rendered more tender than when an exhalation is allowed. In broiling, an exhalation takes place; but as the heat of a naked fire is more nearly applied, the outer surface is in some measure hardened before the heat penetrates the whole, and thereby a great exhalation is prevented, while the whole is rendered sufficiently tender; but this kind of cookery is suited to meats that are chosen to be eaten a little raw. Nearly akin to this is the practice of frying, in which the meat being cut into thin slices, and laid in a pan over the naked fire, the heat is applied more equally to the whole substance. But as the part of the meat lying next to the bottom of the vessel would be suddenly hardened by the heat, it is always necessary to interpose some fluid matter, usually of an oily quality, as butter. A strong heat applied to the latter renders it less miscible with the fluids of the stomach; so that all fried meats are less easily digested than those of any other preparation.

COPAL. Improperly called gum copal, is a hard, shining, transparent, citron-colored, odoriferous, concrete juice of an American tree, but which has neither the solubility in water common to gums, nor the solubility in alcohol common to resins, at least in any considerable degree. By these properties it resembles amber. It may be dissolved by digestion in linseed oil, rendered drying by quicklime, with a heat very little less than sufficient to boil or decompose the oil. This solution, diluted with oil of turpentine, forms a beautiful transparent varnish, which, when properly applied, and slowly dried, is very hard, and very durable. This varnish is applied to snuff-boxes, tea-boards, and other utensils. It preserves and gives lustre to paintings, and greatly restores the decayed colors of old pictures, by filling up the cracks, and rendering the surfaces capable of reflecting light more uniformly.

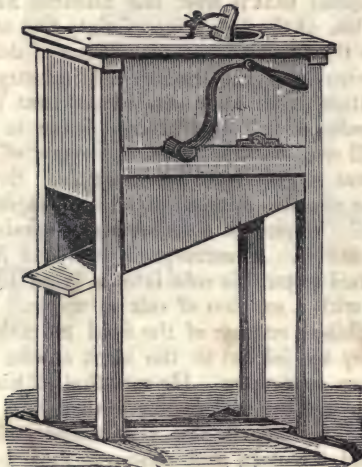
CORD. This is a measure for wood, equal to one hundred and twenty-eight cubit feet; that is, four feet high, four feet wide, and eight feet long. Any other article susceptible of being reduced to regular dimensions, to wit, manure, may be sold by the cord.

CORK. Is a substance analogous to wood; it is the exterior bark of a tree belonging to the genus oak, which grows wild in the southern parts of Europe. When the tree is fourteen or fifteen years old it is fit to be barked, and may be done successively for several years. The bark always grows up again, and its quality improves as the age of the tree increases. If the bark is not taken off in due time it splits and peels off by itself, being pushed away by the second growth.

The best bark comes from Spain and Portugal; it is taken off in sheets, care being used in keeping them as large as possible. After it is detached from the tree, the Portuguese burn or char it, laying the convex side of the bark to the fire in order to straighten and swell it. It is then piled in stacks ready for sale.

Cork is formed into soles for shoes, into corks, bungs for stopping bottles, and into a floatage for the nets of fishermen; it is employed generally, though perhaps with a considerable degree of error, in teaching the art of swimming; and it is also ingeniously used, on account of its lightness, when an amputation of the human leg has been necessary, to supply the deficiency. Spaniards line stone walls with it, which not only renders their houses very warm, but corrects the moisture of the air; and the Egyptians made coffins of it, which being covered in the inside with a resinous composition, preserved their dead bodies. It is burnt to make that light black substance, called Spanish black, from its having been first made in Spain.

CORN. It has not been determined of what country Indian corn, or maize, is a native. It is usually attributed to America, where it was cultivated by the aborigines, at the time of the discovery: but no



CORN SHELLER.

botanist has hitherto found it growing wild in any part of this continent; and most certainly it does not so exist in any portion of the United States. It is also certain that its culture did not attract notice in Europe, Asia, or the north of Africa, till after the voyage of Columbus. It was unknown to the ancient Greek and Roman writers, and

it is not mentioned by the earlier travellers who visited China, India, and other parts of Asia and Africa, and were very minute in describing the productions of the countries they visited. Others, again, have attributed its origin to the western coast of Africa.

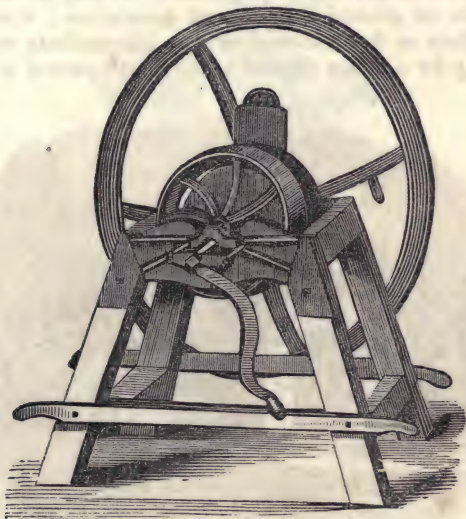
There are many varieties of Indian corn known, of which the most prominent are those distinguished by color, as the yellow corn, white, red, and blue; those that have different numbers of rows as the eight, ten, twelve, sixteen, and twenty-four rowed kinds; those that differ in taste, as the common and sweet kinds; and those that have peculiarities in the shape of the kernels, as the common round corn, the gourd-seed corn, the rice corn, and the Texas corn, each kernel of which has a separate husk or envelope. Dr. Brown of Pennsylvania, in his excellent treatise on corn, enumerates thirty-five of these varieties, and several have since with propriety been added to his catalogue. Indeed, there seems no reason to doubt that this plant, like the potato, may be greatly improved by cultivation, and that varieties may be multiplied to any extent by judicious selection of kinds, and crossing by careful impregnations.

The value of the corn crop is so great as to justify all judicious efforts to augment its culture. The crop of 1848 is estimated at 471,000,000 bushels; that is, over one hundred and fifty bushels for each family. This, at the low price of sixty-five cents to the bushel, amounts to more than three hundred millions of dollars; from a single branch of agricultural investment and industry in a single year. However, its culture is so well understood, that it is superfluous to enter into discussion of it. If a farmer desire to raise a large crop instead of a small one, let him learn the secret of doing it from his neighbors who are setting him the example. Give the land good tillage and ample supplies of manure, and the object will be reached.

CORN-COBS. There is a difference of opinion as to the value of corn-cobs for fodder. A correspondent of the American Agriculturist is accustomed to put his cobs into a large half hogshead tub, and cover them with a solution of salt in water. Here they remain till they have imbibed enough of the fluid to make them soft. In this condition they are fed out to the stock at the rate of a peck a day to a full-grown cow or ox. He says that all his animals are fond of them, that they eat much less hay than before, and that they are in excellent condition. He is also accustomed to have them ground with the corn, and the corn and cob-meal makes the best food for horses, being, he is well satisfied, nutritive as well as keeping the animal loose in the bowels. He has followed the practice fifteen years; and, although his neighbors first ridiculed the idea, yet they became so well satisfied with it, most of them now follow his example.

CORN-STALKS. Most farmers do not seem aware of the value of corn-stalks for fodder. So it might be supposed from the manner

in which they are frequently seen given out for feed, upon the ground, in large quantities, so that but a small fraction of them will be eaten, and the major part entirely lost. If every farmer would pass them through a good corn-stalk cutter, like the one we now have in use, it would increase the value of them for feed and for manure, each year, more than the cost of the instrument. By this means, every pound of them not eaten, is in fine condition for the compost-heap, to be used in the following spring. We have tried several of these cutters, and now use that of Ruggles, Mason & Co., which we think decidedly the best, although there are others we would use, if we could not obtain this. Professor Mapes says he has some winters kept two or three yoke of oxen on cut corn-stalks, prepared in the following manner. They were cut by a machine similar to our own, and then put



COB AND CORN CRUSHER.

into a hogshead. On the top three gallons of hot water, containing a gill of salt, is poured, and then the cask is covered over with a blanket. The steam arising from the hot water softens and swells the stalks to their original size. When cold, a little ground feed is scattered upon them, and thus fed to the cattle. He says that the oxen worked hard all winter, each yoke bringing three loads per day, of more than a ton each, from a distance of three miles, and in the spring they were as well conditioned as in the fall.

COTTAGE. A cottage is a small dwelling-house ; or rather it

is small compared with others in the same vicinity. Many suppose it necessarily has low walls and a steep roof, with perhaps several gables. Such, however, is not the fact. The name rather applies to its comparative size and its internal arrangements, than to its absolute dimensions or style of architecture. Hence, a dwelling in the midst of large mansions or villas might be called a cottage, although if in the midst of small dwellings, much smaller than itself, it might with propriety be dignified with another name. We are accustomed to associate the idea of good taste, without great expense, in the construction of a cottage, whether viewed in relation to its architecture, to its accommodation to family purposes, or to the appendages with which it is connected. Accordingly, there may be large cottages as well as small ones, each adapted to the necessities of the occupants, whether numerous or few ; yet, in both cases, having the appearance of retrenchment or cautious expenditures. It may be Gothic, Swiss, or Grecian, in its general outlines and decorations ; it may cost five thousand dollars or five hundred, or any intermediate sum ; it may have capacity for a dozen persons or the fourth part of a dozen ; yet,



COTTAGE.

in either case, the incidentals about it should leave an impression on the mind of the observer that the proprietor has had, or is able to occupy one far more capacious and expensive. The inductive associations, therefore, from viewing tastefully constructed cottages are of the most agreeable kind, inasmuch as they denote a regard to economy and a well-balanced mind ; and if the proprietors were driven to them by necessity, the indications of good sense and remaining competence furnish more occasion for cheerful than pensive reflections.

COTTON. The history of the growth of cotton is peculiarly interesting. Its use has been known in the earliest ages of which we have any written memorials. The ancient Egyptians were familiar with it. Herodotus says it was known before his day. In his account of the Indians, he says: "They possess a kind of plant which, instead of fruit, produces a wool of a finer and better quality than that of sheep. Of this they make their clothes." Pliny, in his description of the island of Tylos, in the Persian Gulf, mentions among its productions certain wool-bearing trees, that "bear a fruit like a gourd, and of the size of a quince, which, bursting when it is ripe, displays a ball of downy wool, from which are made costly garments of a fabric resembling linen." And we have authentic accounts that the article



COTTON PLANT.

was in possession of the Chinese previous to the thirteenth century; and that, on the ascension of the Tartar dynasty, its culture for common use became general. And it is now cultivated in the East and West Indies, in North and South America, in Egypt, and, indeed, in most parts of the civilized world where the climate is sufficiently warm.

The cotton raised in the United States in 1847 was estimated at 1,041,500,000 pounds, and valued at seventy-three millions of dollars. In 1834, four hundred and sixty millions of pounds were raised; in

1831, three hundred and eighty-five millions ; in 1821, one hundred and eighty millions ; in 1811, eighty millions ; in 1801, forty-eight millions ; and in 1791, only two millions were raised. So rapid has been the increase of its culture in our country. Of the amount of cotton annually manufactured, the following calculation has been made. All such calculations must of course be very general ; and, although defective and imperfect, will convey impressions approximating to the reality. Thus, it is presumed that three hundred and fifty millions of pounds are manufactured in England ; one hundred and fifty millions in the United States ; eighty millions in France ; two hundred and fifty millions in India and China ; twenty-five millions in South America and Mexico ; thirty-five in Germany ; ten in Spain ; twenty in Prussia ; and the remainder elsewhere. About two-thirds raised in the whole world is the produce of the United States. Our cotton crop in 1850 was 1,002,239,000 pounds.

COULTER. The iron which is attached to the beam of the plough, immediately before the share, and with its sharp cutting point, by dividing the turf, renders the operation of ploughing more complete, is called the coulter. It is constructed and applied in many ways and forms, but the object is nearly the same in all, the cutting of the turf before the share. When properly made and affixed, the coulter greatly lessens the force required on the plough to turn the turf well, as it is easier to cut than to tear or break the matted roots of the grass. The coulter should be as near the share as can be conveniently, unless the surface to be ploughed is very level, and the depth is regulated by wheels, in which case a greater distance between the coulter and the share is admissible. The point in all cases should be set slightly forward, as it will, if inclining backwards, exert a constant tendency to throw the plough out of the earth. The cutting should be as near the line to be made by the share as possible, though if there be any deviation it is found to be better to have it made to hand, as the ploughman's phrase is, than otherwise.

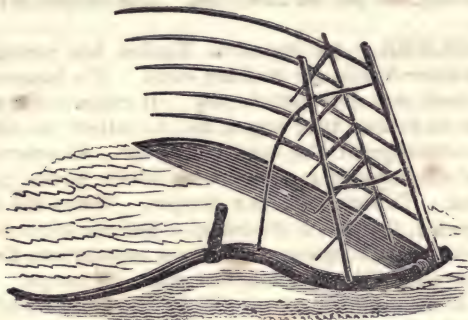
COW. If we were to name the most profitable of all animals, it would be the cow. What other one contributes so much to the sustenance of mankind ? What other one so liberally repays the owner for his care of her ? Is not milk one of the most indispensable articles of human food ? And is not milk almost exclusively from this animal ? In all temperate climates, the cow and her products of milk, butter, cheese, and beef, constitute one of the most important branches of agricultural income. By paying attention to the breeding of the cow, with particular regard to her milking qualities, and to her susceptibilities for becoming good beef, when past the period of utility for dairy purposes, her value is greatly augmented above what it would be if this attention were neglected. This is sufficiently evident to all who have witnessed the changes thus effected. It is known that some cows will not only pay for the feed given to them

and the labor expended in the care of them, but will yield an annual profit varying from twenty to fifty dollars each, while others do not yield milk enough to pay for their feed. The subject is of the utmost importance.

COW-MILKER. An ingenious Yankee has recently invented an Indian Rubber fixture for milking cows. We have made trial of it, and the result was quite satisfactory. It consists of a sack for each teat, of a size to receive that organ, and to adhere so closely to it as to stop the admission of the surrounding air. Connected with the lower end of the sack is a silver tube, which passes into the teat about an inch. To each tube is a stopper. When the sacks are all properly adjusted, the pail is placed in a position to receive the milk, which, as soon as the stoppers are drawn, commences flowing in uninterrupted streams till the whole has made its escape. The process is hastened, if not entirely occasioned, by the pressure of the atmosphere upon the bag. The cow appeared to experience no sensation that caused her in the least measure to move or be uneasy, from which it may be inferred that the insertion of the tubes caused no irritation. As soon as the milk ceased to flow, the tubes and sacks were removed; and it was found by making trial with the hand no milk remained in the bag. The operation was of short duration, probably not exceeding a minute or two for the discharge of the milk after the stoppers were removed from the tubes. The conclusion was drawn that when a person became familiar with applying the sacks to the teats, he would milk eight or ten cows while milking one by hand. To milkmen and all others keeping a large number of cows, the saving of time will be of no trivial consideration. One person would probably milk twenty cows in an hour. The fixture is certainly very ingenious, and should be well tried. No objection to it was apparent in this experiment; yet it might not be an object for those who keep only one or two cows. If it saves time at the rate above supposed, it is no difficult matter to estimate the amount saved in a year to an individual having fifty cows.

CRADLE. In husbandry, a cradle is a frame of wood, with long bending teeth, to which is fastened a scythe, for cutting and laying oats and other grain in a swath. It is comparatively a modern invention. The sickle was formerly used for cutting grain, but that is now rarely used at all, unless on new lands where there are stumps or the surface is uneven, or where the grain has become entangled or fallen down. At first the cradle was a clumsy instrument, and a want of skill in the use of it occasioned a slow process and also a loss of grain, which prevented its immediate general adoption. At this we cannot wonder, when we compare the instrument now manufactured with that delineated in books of agriculture in past periods; and indeed that constructed and adopted in this country is said to be much superior to those usually seen in England. A skilful and

powerful man with a good cradle will cut grain on from two to four acres in a day.



CRADLE.

CREAM. This is the name of the fat, oily, or unctuous fluid which rises on the surface of milk on standing, being specifically lighter than the other parts, and from which the well known article of butter is made. The richness of milk is very generally estimated by the bulk of cream which thus rises to the surface in a given time. The fatty part of the milk which exists in the cream, and which form the butter, is merely mixed with and held in suspension by the water of which the milk chiefly consists. In the udder of the cow it is in some measure separated from, and floats on, the surface of the milk, the later drawn portions being always the richest in cream. During the milking, the rich and poor portions are usually mixed intimately together again, and thus the after-separation is rendered slower, more difficult, and less complete.

That this is really so is proved by two facts—first, that if milk be well shaken or stirred, so as to mix its parts intimately together before it is set aside, the cream will be considerably longer in rising to the surface—and second, that more cream is obtained by keeping the milk in separate portions as it is drawn, and setting these aside to throw up their cream in separate vessels, than when the whole milking is mixed together. When the collection of cream, therefore, is the principal object, economy suggests, that the first, second, third and last drawn portions of the milk should be kept apart from each other. Cream does not readily rise through any considerable depth of milk; it is usual, therefore, to set aside in broad shallow vessels, in which the milk stands at a depth of not more than two or three inches. By this means the cream can be more effectually separated in a given time.

CROCODILE. An enormous river serpent, that is found in

abundance in the Nile and the Niger of Africa. It is sometimes found thirty feet long ; its strength is prodigious ; it seizes even the tiger, and draws him into the water. She lays her eggs, in vast numbers, in the sand, and leaves them to be hatched there in the sun. Providence, however, has provided means to check the increase of this detested race. The crocodile's eggs are greedily destroyed, not only by the ichneumon, but also by the vulture. Flocks of vultures hide themselves within the thick branches of the trees that shade the banks of the river, watching the crocodile in silence while she is laying her eggs ; and when she has retired they rush on with loud cries, and tear up the eggs out of the sand, and devour them. This monster is tameable ; the Siamese take the crocodile young, breed it up in subjection, put a curb in its mouth, and manage it like a horse, the rider directing it as he thinks proper.

CROCODILE, FOSSIL. One of the greatest curiosities in the fossil world which the late ages have produced. It is the skeleton of a large crocodile, almost entire, found at a great depth under ground bedded in stone. This was in the possession of Linkius, who wrote many pieces in natural history, and particularly an accurate description of this curious fossil. It was found in the side of a large mountain in the midland part of Germany, and in a stratum of black fossil stone, somewhat like our common slate, but of coarser texture, the same with that in which fossil fishes in many parts of the world are found. This skeleton had the back and ribs very plain, and was of a much deeper black than the rest of the stone ; as is also the case in the fossil fishes which are preserved in this manner. The part of the stone where the head lay was not found ; this being broken off just at the shoulders, but that irregularly ; so that in one place a part of the back of the head was visible in its natural form. The two shoulder bones were very fair, and three of the feet were well preserved ; the legs were of their natural size ; and the feet preserved even to the extremities of the five toes of each.

CROP. This term in agriculture signifies the quantity, or produce of any sort of field crop, as of grain, roots, plants, grass, or any similar kinds, raised by the farmer on any portion of ground at one time. And from this diversity, they are likewise further distinguished into corn, root, and green crops, according to the circumstances of the case. The culture and utility of the two last sorts have been greatly increased within these few last years, in consequence of their application, as cattle food, being more perfectly understood. It is indeed to this circumstance that much of the modern improvement in husbandry is owing, and from which a great deal of the increased profit of the farmer has been derived.

CROUTE, SOUR-CROUT, or Kroute. As this preparation of cabbage has been found of sovereign efficacy as a preservative in long voyages from the sea-scurvy, it may not be unacceptable to give a

concise account of the process for making it, according to the information communicated by an ingenious German gentleman. The soundest and most solid cabbages are selected for the use, and cut very small, commonly with an instrument made for this purpose; not unlike the plane which is used in this country for slicing cucumbers. A knife is used when the preparation is made with greater nicety. The cabbage thus minced is put into a barrel in layers, hand high, and over each is strewed a handful of salt and carraway seeds; in this manner it is rammed down with a rammer, stratum upon stratum, till the barrel be full; when a cover is put over it, and pressed down with a heavy weight. After standing some time in this state, it begins to ferment; and it is not till the fermentation has entirely subsided, that the head is fitted to it, and the barrel is finally shut up and preserved for use. There is not a drop of vinegar employed in this preparation. The Germans write this preparation in the following manner: Sauer kraut, or saurer kohl, that is, in their language, sour herb, or sour cabbage.

CRUSTACEOUS ANIMALS. The crustaceous animals have been sometimes included in the class of insects, to which they have indeed many strong points of resemblance. They deserve, however, a separate consideration, both on account of their size and importance, and of some anatomical differences of structure. They have articulated limbs, antennæ, and jaws, similarly formed to those of insects. But they breathe by means of gills, and have a regular, double circulation: in which particular they *differ* from insects. Among the most familiar examples of this class are the lobster, crawfish, and what is usually called the horse-shoe. They are covered by a pretty thick, firm shell, which envelopes them completely. As this shell is incapable of growth, it is occasionally changed, to make room for the constant increase in size of the animal. It is thrown off, and their bodies remain for a time entirely naked, and exposed in a soft and defenceless state. In this case, the animal generally retires to some place of concealment and security, and remains till the shell is restored by the deposition of calcareous matter on the external membrane of the skin, which becomes hard and firm, and finally takes the place of the old shell.

CUCKOO. A bird of a grayish color, and less than a pigeon. They are plenty in England, and some other parts of Europe. Before winter sets in this bird disappears; in the spring its voice is heard, earlier or later, as the spring happens to be more or less forward. The cheerful voice of this bird teaches the farmer with great exactness, the proper time of sowing. All other signs may fail, but the voice of the cuckoo is an unerring rule; for heaven has taught it to point out the season. The cuckoo makes herself no nest; she contrives to deposit an egg with the eggs of the hedge sparrow, which hatches it together with her own; and the young cuckoo, almost as

soon as hatched, tumbles out the rest of the brood, and remains possessor of the nest, and the sole object of the future care of its unconscious step-mother, the old sparrow.

CURCULIO. In the United States, particularly, the class of insects which prey on grain, plants, and fruit, is known by this name. The ravages of the grain curculio are not so habitual as those occasioned by the fruit variety of these animal nuisances. However, when they do attack grain they are very destructive. Degur, the celebrated entomologist, says that a few hundred of them admitted to a granary, would, in the course of four or five months, destroy between one and two hundred millions of grains. But a single hole is made in a kernel, and but one egg deposited in each. Barley is a favorite grain with the curculio, or weevil, as it is also called; and small heaps of this placed in granaries, and occasionally removed or subjected to boiling water, are used in some places as decoys for the insect, and to prevent their settling on wheat.

To the ravages of the fruit curculio, which take place every year, and in some cases to the total destruction of the crop, no effectual antidote has been found. Several have been resorted to, but at best, only with partial success. Their attacks on the plum and apricot are the most fatal. They make a circular or half moon invasion on the young fruit, and then under the flap of the wound deposit an egg, which speedily becomes a worm and feeds on the juices or pulp of the fruit. The curculio during the day lies concealed in the branches of the tree; and, it is said, that if previous to the setting of the fruit, cloths are spread beneath on the ground, and then a violent blow applied to the trunk, most of the insects will fall upon the cloths so that they can be gathered up and destroyed. This operation must be repeated time after time, and will in this way do something in causing their destruction; but, it is tedious and in most cases insufficient. The fruit that contains the grub, after a while falls to the ground, the worm takes refuge in the earth, emerges the perfect insect, ready to renew its depredation on the young fruit. To prevent this, all such fruit should at once be gathered up and destroyed, by giving it to the hogs or otherwise, which will also destroy the embryo curculio. Where swine can come to the trees, they will constantly devour the worm as well as the fruit, and thus render an essential service to the horticulturist.

CURDLING. The coagulating or fixing of any fluid-body; particularly milk, by means of rennet. Pausanias says, that Aristæus, son of Apollo, and Cyrene, daughter of the river Peneus, were the first who found the secret of curdling milk. At Florence they curdle their milk for the making of cheese with artichoke flowers; in lieu of the rennet used for the same purpose among us. The Bisaltae, a people of Macedonia, Rochfort observes, live wholly upon curdled

milk, *i. e.* on curds. He adds, that curds are the whole food of the people of Upper Auvergne in France, and whey their only drink.

CURRENTS. Are so called because formerly coming from the Isthmus of Corinth. They come from several other places of the Archipelago. The little Spanish currents are sometimes sold for them. They are a kind of small raisins or dried grapes of different colors, red, white, or black. They must be chosen new, small, and in large masses. When made up in bales they may keep two or three years, without stirring or giving them air. The island of Zante is the chief place whence currents are brought; in the Morea, or the Isthmus of Corinth, which was anciently the principal plantation, they are no longer cultivated; the jealousy of the Turks not allowing large vessels to enter the gulf to take them off the collector's hands. They grow on vines like our grapes; except that the leaves are somewhat thicker, and the grapes smaller; they have no stone. The planters gather them in August, dispose them in couches on the ground till dry, then clean them, and lay them up in Magazines. On barrelling them for sending abroad, they have people to tread them close, that they may keep the better. Zante produces enough yearly to load five or six vessels; Cephalonia three or four; and the other islands one. The Zantiots know but little of the use we make of them.

CUTIS. The skin, in anatomy, is that strong thick covering which envelopes the whole external surface of animals. It is composed chiefly of two parts; a thin white elastic layer on the outside, which is called the epidermis, or cuticle; and a much thicker layer, composed of a great many fibres, closely interwoven, and disposed in different directions; this is called the cutis, or true skin.

CYCLE. A perpetual circulation of the same parts of time. The cycle of the moon is a period of nineteen solar years, equivalent to nineteen lunar years and seven intercalary months; at the end of every nineteen years, the new and full moons happen at very nearly the same times of the year. The ancients discovered this, and reckoned the cycle of the moon so that it terminated the year before the Christian era. This cycle was marked with letters of gold, thence called the *Golden Number*, to find which, add one to the date of the year, say 1829, will make 1830, which, divided by nineteen, will produce ninety-six cycles, and there remain six, the Golden Number for 1829, which shows that the moon is in the sixth year of the lunar cycle. It should be, however, observed, that this cycle of the moon only holds true for three hundred and twelve years; for though the new moons return to the same day after nineteen years, yet not to the same time of the day, but nearly an hour and a half sooner; which error in three hundred and twelve years amounts to an entire day. Yet those who were employed in reforming the calendar, went on the supposition that the cycles returned precisely the same forever. The use of this cycle in the ancient calendar was to show the time of the

new moon and of Easter for each year; in the new one it only serves to find the epochs.

The Cycle of the Sun is the number of years that elapse before the Sundays throughout the year happen on the same days of the month. If there were only 364 days in the year, that would occur every year; if 365, it would occur every seventh year; but as a quarter of a day makes an alteration of a day every fourth year, the cycle must extend to twenty-eight years. The beginning of this cycle, both Julian and Gregorian, is nine years before Christ. *To find the cycle of the sun for any given year*, add nine to the date of the year, and divide the sum by twenty-eight, the remainder will be the number of the years of the present cycle, and the quotient the number of revolutions since Christ. If there be no remainder, it will be the twenty-eighth or last year of the cycle.

DAIRY. A place where milk is deposited, and where it is manufactured into butter, cheese, and other articles of food. In some situations, the farmer brings his milk to market in its natural state, and then he is said to keep a milk dairy; in other situations, he manufactures butter or cheese, and, in such cases, he is said to keep a butter or a cheese dairy. It is quite evident, that it must depend on circumstances which of all these three sorts will afford the most profit. Within a few miles of a large town, where there is always a ready sale for milk and butter, and where the carriage is short, the milk and butter dairy will generally answer best; but where the distance from a market is considerable, the sale of milk in its natural state is out of the question, and the dairy farmer will probably find it necessary to engage in the manufacture of cheese.

The dairy system is perhaps the most profitable, as well as the most pleasing, of all the parts of husbandry. It was certainly the earliest. Herbage may be converted into human food, either in the form of flesh or of milk; but it is calculated, that a much larger quantity of human food will be produced from the same quantity of herbage in the latter case than in the former. The herbage that would be sufficient to add one hundred and twelve pounds to the weight of an ox, would, if employed in feeding cows, afford four hundred and fifty gallons of milk. This, if made into cheese, which is not the most advantageous way of consuming milk, would produce four hundred and thirty pounds, besides the flesh that might be obtained by feeding hogs with the whey.

In some sections of our own country, the dairy operations are extensive, well arranged, and productive of wealth. An instance of this may be found in the northern portion of Ohio, frequently called "The Reserve," which embraces eight counties. The inhabitants here were mostly from New England. It would be difficult to reduce any branch of business to a more perfect system than that practised by the intelligent farmers of the Reserve in the dairying

establishments. The cheese factors purchase the green curd at the rate of from three to four cents per pound, of the farmers, and call at their doors regularly every week-day morning for it, and thus much labor and responsibility is got rid of in curing and marketing the article, and the business, on the whole, is better done than if each farmer pressed and cured the product of his own dairy. A single factor finds no difficulty in manufacturing the curd produced by a thousand cows, and in prosecuting the business to this extent, is warranted in investing a suitable amount of means in the erection of appropriate buildings, and in the purchase of economical appliances for its profitable prosecution. Both farmer and factor appear satisfied that a higher character is given to the cheese in the market, and better prices are obtained for it, than if the old system was practised. It imparts a uniformity to the appearance and quality of the cheese, throughout a large district of country, that no other plan could have so thoroughly accomplished; and on the whole, the system may safely be adopted in any part of the republic suitable to the production of cheese, where an abundant supply of curd can be obtained at a fair price.

DAISY, in *Botany*. The name is derived from day and eye, alluding to the eye-like form of the flower, and its expansion in the day, and in bright weather only, when it presents its front to the sun, following his course till the afternoon, when the flower closes, but opens again for many successive mornings. There is a variety of the daisy called whiteweed, and if once permitted to get well rooted on a farm is destructive to everything else, and is eradicated with the greatest difficulty. It grows so thick as to preclude the appearance of the grasses, or exterminates them if they already exist. This plant is readily known by its white blossom, and its unfortunate prevalence. Thorough cultivation is the only remedy where it is found, but the farmer will find if he destroy the plant effectually on its first appearance, even if requiring considerable labor, the time and exertion for it are well expended. The appearance of this weed denotes bad husbandry.

DAMASK. A silk stuff, with a raised pattern, so that the right side of the damask is that which has the flowers raised above the ground. Damasks should be of dressed silk, both in warp and woof. Those made in France are half an ell in breadth. Damask is also a kind of wrought linen, made chiefly in Flanders; so called, because its large flowers resemble those of damasks. It is chiefly used for tables.

DAMPS. The permanently elastic fluids which are extricated in mines, and are destructive to animal life, are called damps by the miners. The chief distinctions made by the miners are, choak-damp, which extinguishes their candles, hovers about the bottom of the mine, and consists for the most part of carbonic acid gas; and the fire-damp, or hydrogen gas, which occupies the superior spaces, and

does great mischief by exploding whenever it comes in contact with their lights. Carbonic acid gas is generated in large quantities in the vats of cider distilleries, where a small quantity of the liquor remains for any time; or in brewers' vats, in which acetous fermentation is allowed. Numerous deaths occur yearly from the operation of this gas, and farmers and others, who are particularly exposed in cleaning wells, should always take proper precautions. Where it exists in large quantities, it extinguishes flame; and, hence we are fortunately provided with the means of ascertaining its presence. No one, therefore, should venture a descent into any of the places named without first lowering a candle or a lamp. If the flame is extinguished, life would also be put in peril. If it is not extinguished, one may descend safely.

DARK DAYS. The Rev. Mr. Sterling gives an account (as published in the Philosophical Transactions in England,) of a darkness of six or eight hours at Detroit, in North America, on the nineteenth of October, 1762, in which the sun appeared as red as blood, and thrice its usual size; some rain falling, covered white paper with dark drops, like sulphur or dirt, which burnt like wet gunpowder, and the air had a very sulphureous smell. He supposes this to have been emitted from some distant earthquake or volcano. Dr. Darwin adds, that a dry fog (somewhat similar to the appearance at Detroit) covered most parts of Europe, for many weeks, in the summer of 1780, which was supposed to have had a volcanic origin, as it succeeded the violent eruption of Mount Hecla. It is remarkable that the same year which Dr. Darwin mentions, that is, on the nineteenth of May, in the afternoon, 1780, a surprising darkness overspread New England. For several days preceding this darkness, the sun appeared from morning to night, unusually large, and nearly of the color of blood; and this was its appearance during the forenoon of the memorable nineteenth of May. Early in the afternoon, the sun was totally obscured, and all objects had a yellowish or brassy hue. The darkness increased gradually till about three or four o'clock, when the fowls went to roost, candles were necessarily lighted in dwelling-houses, and it seemed to be night. During the progress of this wonderful fog, some scattering drops of rain fell, attended, as it was then said, with a blackish powder that tinged the substances which were touched by it.

DARKNESS. Means the absence or the want of light. In common language we consider ourselves as being in darkness, whenever objects that are pretty near to us, cannot be distinguished from each other; but perfect darkness does not easily occur; and it is owing to this that several animals can see in what we call darkness, viz., the eyes of those animals are so formed as to be able to see with very little light. But it appears from the experiments of M. le Cat and others, that no animal can see in perfect darkness where no light

is emitted, even from any phosphorescent body ; and such phosphorescence may sometimes proceed even from the animal itself.

DATE. The fruit of the date-palm, a tree of the natural order *Palmae*, inhabiting the north of Africa, from Morocco to Egypt, Syria, Persia, the Levant, and India, and which is also cultivated in Italy and Spain. Dates form the principal nutriment of the inhabitants of some of the above countries, and are an important article of commerce. This fruit is an oval, soft, fleshy drupe, having a very hard stone, with a longitudinal furrow on one side, and when fresh, possessing a delicious perfume and taste. Dates are sugary, very nourishing, wholesome, and require no preparation ; but when dried, and a little old, as they usually are when imported into Europe and the United States, they are not much esteemed, and are little used in the countries where they grow. The best fruits have firm flesh of a yellow color. The inhabitants of Tunis, and several other countries, every year journey in crowds, into Biledulgerid to procure dates.

Almost every part of this valuable tree is converted to some use. The wood is very hard, almost incorruptible, and is used for building. The leaves, after being macerated in water, become supple, and are manufactured into hats, mats, and baskets. The petioles afford fibres from which cordage is made. The nuts after being burnt, are used by the Chinese in the composition of India ink. Palm wine is made from the trunk. For this purpose, the leaves are cut off, and a circular incision made a little below the summit of the tree, then a deep vertical fissure ; and a vase is placed below to receive the juice, which is protected from evaporation.

The date-palm is a majestic tree, rising sixty feet and upwards, the trunk is straight, simple, scaly, elegantly divided by rings, and crowned at the summit by a tuft of very long pendant leaves. The leaves are ten or twelve feet long, composed of alternate narrow folioles, folded longitudinally. The Arabs pretend that they attain the age of two or three hundred years. This valuable tree would undoubtedly succeed in the southern parts of the United States. The wood, though of spongy texture, is employed for the beams and rafters of houses, and for implements of husbandry, which are said to be very durable. The pith of the young trees is eaten, as well as the young and tender leaves. A considerable traffic is carried on in the leaves, which, under the name of palms, are sent to Italy, to be used in the grand religious ceremonies of Palm Sunday. In Persia, an ardent spirit is distilled from the fruit ; and, in many places, the stones are ground to make oil, and the paste that is left is given as food to cattle and sheep.

DAY. Nations have differed much from each other as to the commencement, and still more in the division of the day. The Chaldeans, Syrians, Persians, and Indians began the day at sunrise, and divided both the day and night into four parts. This division of the

day into quarters was in use long before the invention of hours. The Chinese, who begin their day at midnight, and reckon to the midnight following, divide this interval into twelve hours, each equal to two of ours, and distinguished by a name and particular figure. The Romans called the time between the rising and setting sun, the natural day, and the time in the whole four and twenty hours the civil day, and this definition has been adopted in modern Europe. They began and ended their civil day at midnight, and derived this practice from their ancient jurisprudence and rites of religion, established long before they had any idea of the division into hours. According to Varro, the first sun-dial seen at Rome was brought from Catana in Sicily, in the first Punic war, as part of the spoils of that city. It was erected unskilfully in the forum, and though it probably was not adapted to the latitude of the place, yet it was the only measure of hours they had for near a century afterwards. Thus it appears that the Romans learned the division of the day into hours from a dial of Greek construction. The Greeks divided the natural day into twelve hours, a practice which, according to Herodotus, they derived from the Babylonians. These hours were of course unequal at different seasons of the year, varying in the same proportion as the length of the natural day.

The days of the week received their names in the following manner. The first day of the week was called Sunday, from the sun, to which by the ancient heathens it was dedicated; Monday, from the Moon; Tuesday, from the Saxon word, *Tuisco*, and is the same as Mars; Wednesday, from a Saxon word, *Woden*, a heathen deity; Thursday, from the Saxon word, *Thor*; Friday, from *Friga*, a Saxon goddess; and Saturday, from two Saxon words, which signify the day of Saturn. Christians call the first day of the week Sunday, in honor of Jesus Christ, the Saviour of the world, who is denominated the Sun of Righteousness.

DECEMBER. The month wherein the sun enters the tropic of Capricorn, and makes the winter solstice. Among the ancient Romans, December was under the protection of Vesta. Romulus assigned it thirty days, Numa reduced it to twenty-nine, which Julius Cæsar increased to thirty-one. In the reign of Commodus this month was called, by way of flattery, Amazonius, in honor of a courtesan, whom that prince passionately loved, and had painted like an Amazon; but this name died with that tyrant. At the end of December they had the juveniles ludi; and the country people kept the feast of the goddess Vacuna in the fields, having then gathered in their fruits, and sown their corn; whence seemed to be derived our popular festival of harvest-home.

DEATH. An animal body, by the actions inseparable from life, undergoes a continual change. Its smallest fibres become rigid; its minute vessels grow into solid fibres no longer pervious to the fluids;

its greater vessels grow hard and narrow ; and every thing becomes contracted, closed, and bound up ; whence the dryness, immobility, and extenuation, observed in old age. By such means, the offices of the minuter vessels are destroyed ; the humors stagnate, harden, and at length coalesce with the solids. Thus are the subtillest fluids in the body intercepted and lost, the concoction weakened, and the reparation prevented ; only the coarser juices continue to run slowly through the greater vessels, to the preservation of life, after the animal functions are destroyed. At length, in the process of these changes, death itself becomes inevitable, as the necessary consequence of life. But it is rare that life is thus long protracted, or that death succeeds merely from the decays and impairment of old age. Diseases, a long and melancholy train, cut the work short.

All our first associations with the idea of death are of the disgusting and alarming kind ; and they are collected from all quarters ; from the sensible pains of every sort ; from the imperfections, weakness, loathsomeness, corruption, and disorder, attendant on disease, old age, and death, whether animal or vegetable. This seems perfectly natural ; for these things are usually viewed with disgust and shame ; whereas, those things to which they are opposed, or with which they are placed in contrast, such as health, beauty, youth, and the lustre of life, are objects of admiration and are sources of social delight. And it is necessary, that the heedlessness and inexperience of infancy and youth should be guarded by such terrors, and their headstrong appetites and passions curbed, that they may not be hurried into danger and destruction before they are aware. It is proper, also, that they should form some expectations with respect to, and set some value upon, their future life in this world, that so they may be better qualified to act their parts in it, and make the quicker progress to perfection during their passage through it.

DECOMPOSITION. This term, in chemistry, denotes the resolution of a compound substance into its constituent parts, which are exhibited either separate, or in some new combination. In agriculture, it is principally used to signify the process by which animal and vegetable bodies pass into a state that renders them serviceable as food for plants. During life, the elements of organic bodies, whether animal or vegetable, are held together by vital affinities, under the influence of which they were first united. When life ceases, these elements become subject to other laws, those that govern inert matter. The original affinities that were suspended during the vital organization, again operate, other combinations are formed, and the organized structure passes to decay. The rapidity and extent of decomposition are, in a great measure, depending on the circumstances under which the process takes place. Substances kept perfectly dry, and at certain temperatures, decompose very slowly, or not at all. Moisture, unequal temperature or the presence of certain agents, aid the process mate-

ally. It is by decomposition that all manures are formed, and it is by regulating, aiding, and combining the action of different substances, that the most valuable composts and fertilizing powders are prepared. To preserve plants, timber, and vegetables from premature decomposition, has occasioned much research, and though in some cases successful, there are others in which all efforts to arrest the original laws of action have proved unavailing.

DEER. An animal which in England is kept in parks, either for ornament or for the chase; the flesh of which is called venison. In North America, we have five animals of the deer kind, the Moose or Elk of Europe; the American Elk, a stately animal, whose branching horns are sometimes five feet in length; the common Fallow or Virginia deer; the mule, or black tailed deer of the Rocky Mountains; and the Reindeer. The male of the fallow deer, is called buck, the female, hind. The stag, hart, or red deer of Europe, the female of which is called hind, is not found in this country. It is a characteristic of all these animals, that they shed their horns once a year.

DESERT. A wild, uncultivated, uninhabited place or country. Geographers use the word in the general for all countries little, or not at all, inhabited. In Scripture, we find several places in the Holy Land, or places adjoining thereto, called deserts, which were not absolutely barren or unfruitful, but such as were rarely sown or cultivated; and though they yielded no crops of corn or fruit, they nevertheless afforded herbage for the graziers of cattle, with fountains or rills of water, though more sparingly interspersed than in other places. The wilderness or desert which was the scene of our Saviour's temptation, with several others mentioned in Scripture, was of this nature and quality. Many of these deserts contained cities and villages, rich and well peopled; and, indeed, almost every city had some desert according to the Scripture idiom, belonging to it for pasture; so that the word meant no more than a land, or tract, that bore neither corn, wine, nor oil, but was left to the spontaneous productions of nature.

DEVON CATTLE. Among the several varieties of the bovine family in Great Britain the Devons have been deservedly noted. With many it has been a great favorite; and its popularity is well deserved. Among the reasons for it the following may be named. These cattle, although not large are well formed, their several parts distinguished for symmetry; oftentimes highly beautiful, yet having sufficient bone and muscle to render them hardy and active. They have great uniformity of appearance in every feature, size, shape, horns, and color. The oxen exceed the cows in size more than is common with other breeds; and both, when cut up for beef are found to go much beyond what is estimated by those not familiar with them. And their meat is distinguished for fine flavor and rich

juices, being duly formed from an alternate mixture of fat and lean, And, what is equally important, whether in the yoke or for the dairy, they have great docility and good temper. Within the last thirty years the Devons, by due crossings, have been greatly improved ; they have become heavier and better milkers. And, although there is a general opinion that as milkers they are inferior to several other breeds so far as the quantity of milk is concerned, the quality of their milk is by all admitted to be unsurpassed. This, however, by their advocates is denied ; and Mr. Bloomfield, the manager of the late Lord Leicester's estate at Holkham, has challenged England to milk an equal number of cows of any breed, against forty pure Devons, to be selected out of his own herd, without as yet having found a competitor. See Steven's edition of "Youatt and Martin on Cattle."



DEVON BULL.

DEW. A dense, moist vapor, falling on the earth in the form of a mistling rain, while the sun is below the horizon. The most plentiful deposits occur, when the weather is clear and serene ; very little is ever deposited when the weather is not so. It is never seen on nights both cloudy and windy. It is well known, likewise, that a reduction in the temperature of the air, and of the surface of the earth, always accompanies the falling of dew, the surface on which it is deposited being, however, colder than the air above. These phenomena admit of an easy and elegant explanation from the well known effect of the radiation of caloric from bodies. This radiation

constantly taking place in all bodies, it is obvious that the temperature of any body can remain the same only by its receiving from another source as many rays as it emits. In the case of the earth's surface, so long as the sun remains above the horizon, it continues to receive as well as to emit heat; but when the sun sinks below the horizon, no object is present in the atmosphere to exchange rays with the earth, which still emitting heat into free space, must, consequently, experience a diminution in its temperature.

Thus the earth becomes not only many degrees cooler than the superincumbent air; and, as the atmosphere always contains watery vapor, this vapor becomes condensed on the cold surface; hence, the origin of dew, and, if the temperature of the earth is below thirty-two degrees, of hoar frost. And since the projection of heat into free space takes place most readily in a clear atmosphere, it is under the former condition that dew and hoar frost are formed; for if the radiant caloric, proceeding from the earth, is intercepted by the clouds, an interchange is established, and the ground retains nearly, if not quite, the same temperature, as the adjacent portions of the air. Whatever circumstances favor radiation favor also the production of dew; and, accordingly, under the same exposure, dew is much more copiously deposited on some surfaces than on others. Gravel walks and pavements project heat and acquire dew less readily than a grassy surface. Rough and porous substances, as shavings of wood, take more dew than smooth and solid wood. Glass projects heat rapidly, and is as rapidly coated with dew. Bright bodies attract dew much less powerfully than other bodies.

Dew acts an important part in the processes of agriculture, and in the nutrition and growth of plants. Large quantities of the most active agents escape from the earth during the processes of decomposition and evaporation in the shape of gases, and these combined with the aqueous vapor are deposited with the dew on the earth, or on the plants, and in either case are available to nutrition. Hence the advantages of frequently stirring the earth, and keeping the surface in a pulverised and absorbing state. In some parts of the world it rarely rains, but the dews are so copious, that vegetation does not seem to suffer from the want of water. Spreading a substance, no matter how flimsy, as a thin cloth, over vegetables will preserve them from severe frosts, if it is not allowed to touch them; acting by intercepting the heat. Every one has observed that plants liable to destruction by frost, remain green much longer under the shade of trees than when exposed. Thus potatoes or any thing else planted in an orchard, will be unhurt by frost as far as the branches of the trees extend, while the tops in the uncovered spaces will be wholly prostrated.

DIBBLER. This is an instrument used in gardening for making holes in the ground to receive roots in transplanting. It is generally

made of an old spade handle, having the lower part sharpened, and sometimes shod with iron. The depth of its insertion in the soil may be regulated by a small cross-bar, which can be placed at various heights, according to the size of the root for which it is used. In some parts of England various kinds of seed are planted with a dibbler.

DIGESTION. By the term digestion, in the more perfect animal, is generally understood that process by which certain substances, called nutritive, are converted into a homogeneous semi-fluid mass, from the cavity containing which small vessels drink up the more elaborated portion, and convey it into other larger ones, containing blood, with which it is mixed and carried to the heart. The simplest kind of digestion is that performed by presenting a watery fluid to a moist surface, which converts it into its own nature. Examples of this are seen in the lower orders of animals, the individuals of which consist almost entirely of a closed sack or pouch, on the external surface of which the above change is accomplished. On nearly the same line may be put the spongy extremities of the roots of plants, which absorb or drink up the nutrimental fluid from the soil.

In proportion as the animal structure becomes more complex, the subsidiary or preparatory organs are increased in number, to qualify the stomach for acting on the great variety of food, often of a solid and dense texture, which is taken for the purpose of nourishment. The most generally distributed apparatus for the breaking down and grinding the food, before its reception into the stomach, is the teeth. In an omnivorous animal, such as man, who appropriates to the gratification of his appetite, food from all the kingdoms of nature, these instruments are of three kinds; the two chief, however, are the front or incisor teeth, which tear, and the back or molar teeth, which triturate and more minutely divide the alimentary matter, in what is called mastication. In many birds, which swallow directly their food without chewing or masticating, there is a mechanical contrivance, in the gizzard, by which it is broken down and prepared to be operated on by the stomach proper.

Those animals, such as the serpent tribe, which swallow their prey without any preliminary process, except breaking the more prominent and resisting parts, such as the bones of the creatures which they have seized, have very slow digestion. They will remain for many hours in a half torpid state, unable and unwilling to move, until the substance which they swallowed has undergone the requisite change, by the digestive action of the inner surface of their stomach. It would seem then to be an established principle in the history of digestion, that unless the nutrimental matter be of the very simplest kind, and presented in a fluid state, as in the lowest animals, and in vegetables, it requires to be subjected to some preparatory process, before it can be received by the stomach, and undergo in it the

changes by which it is to be fitted for nourishing all parts of the living body.

DILUENTS. Watery liquors which are believed to increase the fluidity of the blood, and to diminish the acrimony and viscidness of several of the secreted or excreted fluids. Simple water-gruel, weak tea, and a great variety of such liquors, are much used as diluents. Such drinks are especially required in febrile diseases, both as removing the irritation caused by thirst, and as diluting the acrimony of the contents of the stomach and bowels, and as facilitating the perspiration. In various diseases of the stomach and bowels, diluents are very useful, by mixing with the bile and other fluids, and rendering them more mild. They may also assist in digestion, by rendering the chyme and the chyle thinner and more easily absorbed by the lacteals. As watery fluids pass off readily by the kidneys, they are of great utility in diseases of the urinary organs and of the bladder. Though it may seem a good rule, to let the salutary instinct of nature for diluents in feverish disorders be gratified, yet, as a large quantity of fluid will, for a time, distend the blood-vessels, and so increase the action of the heart and arteries, it may be prudent to restrain the appetite of thirst in those inflammations where we combat the disease by large bleedings. It will be better, in such cases, to allay thirst by very small quantities of fluid, or by eating fruits either fresh or preserved. The temperature of diluting fluids is to be regulated by the state of the body at the time of giving them. In the cold or shivering stage of a disease they should be hot ; when the heat is great and the skin dry, they should be cold ; and in most other cases they should be tepid. See Gunn's Domestic Medicine.

DINNER. Is the principal meal in modern times, and the one at which luxury is chiefly indulged in. Much disease arises from the mismanagement of dinner, both as to time, and to the quantity and variety of food taken. Physicians cannot lay down any general rule for the time at which persons should dine ; the hour when nature requires it, and the period which is most adapted for it, as furnishing a supply of aliment before the exhaustion of the powers has proceeded too far, would seem to be two or three o'clock ; but individuals vary in their habits, in the kind of breakfast they take, and in their powers of digestion ; all which are to be taken into account by the medical man who gives his advice on the subject. Some persons much troubled with indigestion, are relieved by the simple expedient of taking their dinner sooner or later, as they find upon trial what time agrees best ; and much may be done to relieve stomach complaints by diminishing the quantity of food and drink taken at dinner. Late copious dinners are really nothing else than heavy suppers, and in all likelihood will produce restlessness, nightmare, and various unpleasant symptoms. The dinners of children should always be in the middle of the day.

DIRT SCRAPER. This is an instrument designed for the removal of dirt in the making and repairing of roads. It is also used in levelling the ground, particularly about newly erected houses; both in carrying what is not wanted on hills to adjacent hollows, and also in making excavations for cellars and wide ditches. A yoke of oxen or a span of horses with a man will thus remove as much dirt in one day, as he could remove with a spade and barrow in a week. The best scrapers are made of iron, save the handles, and would be found convenient on every farm.



DIRT SCRAPER.

DISEASE. In medicine, that condition of the animal economy, in which one or more of the functions is altogether impeded, or is performed with difficulty or with pain. Various definitions of disease have been given by different physicians. Some have laconically defined it the absence of health, forgetting that this involves another definition, that of health. Some have described it as existing in particular conditions of the fluids, or of the solids. But it is unnecessary to inquire into the variety of definitions of disease, since the word is well understood by all, and is used under the same acceptation by the peasant and the philosopher.

DISSOLUTION. In a general sense, the separation of the parts of a body which, in the natural structure, are united; or the reduction of concrete bodies into their smallest parts without regard to solidity or fluidity. Thus we speak of the dissolution of salts in water, of metals in nitro-muriatic acid, and of ice or butter by heat; in which cases, the dissolution is effected by a menstrum or particular agent. We speak also of the dissolution of flesh or animal bodies, when the parts separate by putrefaction. Dissolution is then, the act of liquifying or changing from a solid to fluid state by heat; a melting; a thawing; as the dissolution of snow and ice, which converts them into water. The reduction of a body into its smallest parts, or into very minute parts, by a dissolvent or menstrum, as of a metal

by nitro-muriatic acid, or of salts in water. The separation of the parts of a body by putrefaction, or the analysis of the natural structure of mixed bodies, as of animal or vegetable substances ; decomposition.

DISTRIBUTION OF PLANTS. While there is scarcely any part of the globe on which plants are not found, many of the most important ones are confined by certain causes to particular zones or locations, and attempts to produce them in other situations, must of necessity be abortive. Thus, the palm of the tropics and the maple of the arctic circle cannot be made to change their places ; and the same law applies to the apple and the orange, the Irish potato and the yam. The grand modifying agent in the distribution of plants, is temperature ; and this cause divides the vegetable productions of the globe into zones, north and south of the equator, regularly marked, unless influenced by causes local in their nature and action. There are some general rules applicable to the investigation of the laws that govern distribution, which cannot be overlooked ; and these are difference in elevation. It has been found that the average difference in temperature on any given degree of longitude, is about equal to a degree of Fahrenheit for every degree of latitude ; and that in elevation, there is on an average, a decrease of temperature equal to a degree, for every five hundred feet of ascent.

The result of these laws is, that plants of the temperate zones, which will not grow on the plains of the tropics, flourish on the sides of the mountains or the elevated plains, the temperature resembling that of their favorite clime. Thus wheat and barley which cannot be grown on the plains of the tropics, produce abundantly on the table lands, some eight or ten thousand feet above the sea. The effect of these laws of distribution are sensibly felt in the United States, in the production of fruits and grain. Thus the apple, which finds its favorite clime in the northern States, does not grow in the southern ones ; and the peach of the north is so inferior to that of the south as scarcely to be considered the same fruit. The proper wheat zone of the United States may be said to extend only from the thirty-eighth to the forty-third degree of latitude. It is indeed cultivated both to the north and the south of these limits, but experience proves that the crop is less certain and the grain less perfect without than within them. In the northern States corn is not as certain a crop as it is south, but as far north as it succeeds, the produce is usually more abundant, and the grain of a better quality than that grown farther south.

DIVISION OF LABOR. That separation of employments, which, in political economy, is called the division of labor, can take place only in civilized countries. In the flourishing states of Europe and America we find men not only exclusively engaged in the exercise of one particular art, but that art subdivided into numerous

branches, each of which forms a distinct occupation for the different workmen. Observe the accommodation of the most common artificer or day-laborer in a civilized and thriving country, and you will perceive that the number of people, of whose industry a part, though but a small part, has been employed in procuring him this accommodation, exceeds all computation. The woolen coat, for example, which covers the laborer, though it may appear coarse and rough, is the produce of the joint labor of a great number of workmen. The shepherds, the sorter of the wool, the carder, the dyer, the spinner, the weaver, the fuller, the dresser, with many others, must all join their different arts to complete even this ordinary production. How many merchants and carriers, besides, must have been employed in transporting the materials from some of those workmen to others who often live in a distant part of the country! How much commerce and navigation in particular, how many ship-builders, sailors, sail-makers, rope-makers, must have been employed, in order to bring together the different drugs made use of by the dyer, which often come from the remotest corners of the world! What a variety of labor, too, is necessary in order to produce the tools of those workmen! To say nothing of such complicated machines as the ship of the sailor, the mill of the fuller, or even the loom of the weaver, let us consider only what a variety of labor is requisite to form that very simple machine, the shears with which the shepherd clips the wool. The miner, the builder of the furnace for heating the ore, the burner of the charcoal to be made use of in the smelting-house, the brick-maker, the brick-layer, the workmen who attend the furnace, the mill-wright, the forger, the smith, must all of them join their different arts in order to produce them.

Were we to examine, in the same manner, all the different parts of his dress and household furniture, the different hands employed in preparing his food, the glass window which lets in the heat and the light, and keeps out the wind and the rain, with all the knowledge and art requisite for preparing that beautiful and happy invention, together with the tools of all the different workmen employed in producing those different conveniences; if we examine all these things, and consider what a variety of labor is employed about each of them, we shall be sensible that without the assistance and co-operation of many thousands, the very humblest person in a civilized country could not be provided for, even according to what we falsely imagine the easy and simple manner in which he is commonly accommodated. Compared, indeed, with the more extravagant luxury of the great, his accommodation must no doubt appear extremely simple and easy: and yet it may be true, perhaps, that the accommodation of an European prince does not always so much exceed that of an industrious and frugal peasant, as the accommodation of the latter exceeds that

of many an African king, the absolute master of the lives and liberties of ten thousand naked savages.

DOCK. This is the name of a well known plant ; and, it is applied to several species of the family ; sometimes cultivated in gardens, but generally considered a troublesome weed. It has stout roots and long leaves. Their roots have an austere taste, are stringent, and styptic, and the seeds are sometimes used in hemorrhage. Fortunately the dock does not, like the Canada thistle, spring from the lower roots when the crown of the plant is cut off ; and all that is necessary, therefore, to eradicate it, is to strike it off below the surface. If this is done cleanly and at once, the plant is destroyed.

DOG. The largeness of the make, the elegance of the form, the strength of the body, the freedom of the motions, and all the exterior qualities, are not the noblest properties in an animated being ; and, as, in mankind, understanding is preferred to figure, courage to strength, and sentiment to beauty ; so the interior qualities are those which we esteem most in animals ; for it is in these that they differ from the automaton ; it is by these they are raised above the vegetable, and made to approach nearer to ourselves ; it is their sense which ennobles their being, which regulates, which enlivens it, which commands the organs, makes the members active, gives birth to desire, and gives to matter progressive motion, will, and life.

The Dog, independently of his beauty, vivacity, strength, and swiftness, has all the interior qualities which can attract the regard of man. The tame dog comes to lay at his master's feet his courage, strength, and talents, and waits his orders to use them ; he consults, interrogates, and beseeches ; the glance of his eye is sufficient ; he understands the signs of his will. Without the vices of man, he has all the ardor of sentiment ; and what is more, he has fidelity and constancy in his affections ; no ambition, no interest, no desire of revenge, no fear but that of displeasing him ; he is all zeal, all warmth, and all obedience ; more sensible to the remembrance of benefits than of wrongs, he soon forgets, or only remembers them to make his attachment the stronger ; far from irritating, or running away, he even exposes himself to new proofs ; he licks the hand which is the cause of his pain, he only opposes it by his cries, and at length entirely disarms it by his patience and submission.

More docile and flexible than any other animal, the dog is not only instructed in a short time, but he even conforms himself to the motions, manners, and habits of those who command him ; he has all the manners of the house where he inhabits ; like the other domestics, he is disdainful with the great, and rustic in the country, always attentive to his master ; and striving to anticipate the wants of his friends, he gives no attention to indifferent persons, and declares war against those whose station makes them importunate ; he knows them by their dress, their voice, their gestures, and prevents their ap-

proach. When the care of the house is entrusted to him during the night, he becomes more fiery and sometimes ferocious; he watches, he walks his rounds, he scents strangers afar off; and, if they happen to stop, or attempt to break in, he flies to oppose them, and, by reiterated barkings, efforts and cries of passion, he gives the alarm. As furious against men of prey as against devouring animals, he flies upon, wounds, and tears them, and takes from them what they were endeavoring to steal; but, content with having conquered, he rests himself upon the spoils, will not touch it even to satisfy his appetite, and at once gives an example of courage, temperance, and fidelity.

DOG DAYS. Certain days in the year called by this name, from the dogstar, or Sirius. They are also called canicular days, from *canis*, the Latin word signifying dog. On these days the dogstar rises and sets with the sun. The ancients imagined that the rising of the dogstar with the sun, occasioned the sultry weather and the diseases usually experienced in the latter part of summer. The Romans sacrificed a brown dog every year to appease the rage of Sirius. The rising of the stars, however, not only varies according to the latitude of different places, but is always later and later every year in the same place, so that in time Sirius may, by the same rule, be charged with bringing frost and snow when he rises in the winter. In our almanacs the season of dogdays is set down as occurring from the third of July to the eleventh of August, without any regard to the position of Sirius. In England, the dogdays have caused some variety in their calendar. Bede refers to a time when they commenced on the fourteenth of July; in the reign of Elizabeth they were reckoned from the sixth of that month to the sixth of September; from the restoration of Charles II., to the correction of the calendar, the beginning of this period was on the nineteenth of July, and the end of it, on the twenty-eighth of August; after the correction of the calendar the time was changed to the thirtieth of July and the seventh of September; and of late in the English almanacs they are placed as we first mentioned.

DORKING HENS. This is a variety of barn yard fowls which take their distinctive appellation from a town of that name in the county of Surrey, England. They have generally been much admired by all, we believe, who have been familiar with their merits. They are not as large as some varieties that have lately attracted notice, but they are sufficiently so for profit, holding a medium rank between the stately gobbler fraternity, and the smaller varieties of the hen family. Their native color is generally pure white, spotted or spangled with black; and these colors sometimes merge into a grey or grizzle. The cocks are magnificent birds, with a surpassing brilliancy of plumage, rarely equalled by other kinds. The hens are well formed with broad breasts; are usually good layers; and their young are easily reared. It has been affirmed that the Dorkings

originally had five toes, or in other words, two hind toes; and that if they do not possess this peculiarity now, it is because they have lost it by successive crossings.



DORKING HENS.

DORMANT state of animals. We are all accustomed to see a large part of creation, during summer, in great activity, and in winter returning to an apparently inanimate state; we mean the plants; but this phenomenon is not common in the case of animals. There is, however, a small number of animals, which, besides the daily rest that they have in common with most other animals, remain, during some months in the year, in an apparently lifeless state; at least, in utter inactivity. Except the hedgehog and the bat, all the mammalia subject to this dormant state, belong to the class of digitated animals. They are found not only in cold climates, but in very warm ones; for instance, the jerboa in Arabia, and the taurick in Madagascar.

The period of long sleep generally begins when the food of the animal begins to become scarce, and inactivity spreads over the vegetable kingdom. Instinct, at this time, impels the animals to seek a safe place for their period of rest. The bat hides itself in the dark, or in walls of decayed buildings. The hedgehog envelopes himself in leaves, and generally conceals himself in fern-brakes. Hamsters

and marmots bury themselves in the ground, and the jumping-mouse of Canada and the United States, incloses itself in a ball of clay. At the same time, these singular animals roll themselves together in such a way that the extremities are protected against cold, and the abdominal intestines, and even the windpipe, are compressed, so that the circulation of the blood is checked. Many of them, especially the gnawers, as the Hamster and Norway rat, collect previously to their period of sleep, considerable stores of food, on which they probably live until sleep overpowers them.

DOVE. A wild pigeon, of which there are three sorts, namely, the ring dove, the largest of the pigeon tribe, so wild that it cannot be domesticated; the stock dove, that is migratory; and the turtle dove, a shy and retired dove living in the woods. These descriptions apply to the European varieties. In America we have several kinds of pigeons, of which the passenger pigeon is the most remarkable. In the western states these birds assemble in such countless numbers, as to darken the air by their flocks, and desolate the whole country for miles around their breeding places. The turtle dove of America differs in some measure, from the turtle dove of Europe.

DOWN. In commerce, the fine feathers from the breasts of the several birds, particularly of the duck kind. That of the eider duck is the most valuable. These birds pluck it from their breasts and line their nests with it. We are told that the quantity of down found in one nest more than filled the crown of a hat, yet weighed no more than three-quarters of an ounce. Three pounds of this down may be compressed into a space scarcely bigger than one's fist, yet is afterwards so dilatable as to fill a quilt five feet square. That found in the nest is most valued, and termed live down; it is infinitely more elastic than that plucked from the dead bird, which is little esteemed.

DRAINING. Few expenditures in husbandry are calculated to make better returns than those made in draining, a branch of labor which has had in this country but a limited application. Many of our best lands are permitted to remain in a comparative unproductive state, on account of the water, which saturates the surface, or reposes on the subsoil. To render these lands productive, even for arable purposes, it is only necessary, by well-conducted and sufficient drains, to collect and carry off the surplus water which falls upon the surface, or rises from the springs below. The philosophy of draining is simply this:—Air and heat are essential agents in preparing the food of plants which is deposited in the soil, and they are also necessary for the healthful development of most of the cultivated varieties. These agents are in a measure excluded from the soil by the water. The temperature of a soil, habitually saturated with spring water from beneath the surface, seldom exceeds fifty or sixty degrees at midsummer. Hence the grains and grasses, which require a heat of eighty

or ninety degrees to bring them to a high state of excellence, can never thrive in these cold situations, where they find neither the warmth nor the food suited to their habits. It is as unreasonable to expect it as it is to expect the farmer's wife can bake bread in a cold oven. But drain these soils, and they become light and porous; pervious to solar and atmospheric influence, the process of vegetable decomposition is accelerated, and a high state of fertility is developed.

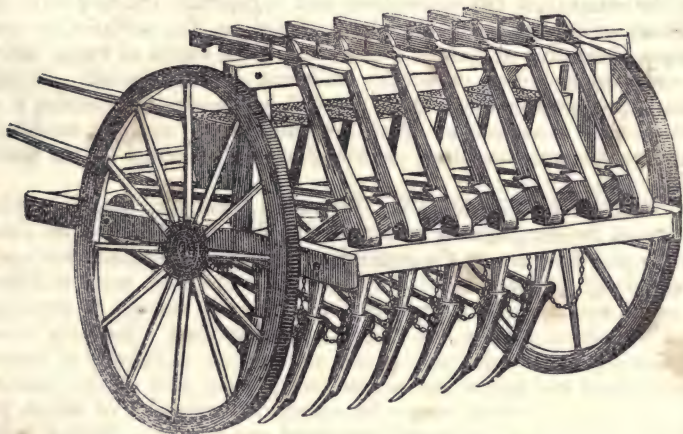
The acknowledged utility of irrigation, or of spreading, occasionally, the water from streams, or the highways over lands, has led to a misapprehension with many of the principles of draining. Irrigation is employed to furnish water to soils, generally slopes, where it is deficient, and from whence it speedily passes off, or to cover grounds in winter to exclude severe frosts. The water thus employed is nearly of the warmth of the atmosphere, and is generally charged with fertilizing properties. Draining is employed on flat surfaces, or upon slopes abounding in springs, where there is an excess of water, and of a temperature which materially chills and deadens the soil. Irrigation supplies water where there is a deficiency—draining carries it off where there is an excess. Both are intended, by opposite modes, to produce the same result—a suitable degree of moisture for the wants of the crop.

DRESSING OF MEAT. By means of culinary fire, is intended to loosen the compages or texture of the flesh, and dispose it for dissolution and digestion in the stomach. The usual operations are roasting, boiling, and stewing. In roasting, it is observed, meat will bear a much greater and longer heat than either in boiling or stewing; and in boiling, greater and longer than in stewing. Roasting being performed in the open air, as the parts begin externally to warm, they extend and dilute, and so gradually let out part of the rarefied included air, by which means the internal succussions, on which the dissolution depends, are much weakened and abated. Boiling being performed in water, the pressure is greater, and consequently the succussions to lift up the weight are proportionably strong, by which means the coction is hastened; and even in this way there are great differences; for the greater the weight of water the sooner is the business done.

In stewing, though the heat be much less than what is employed in the other methods, the operation is much more quick, because performed in a close vessel, and full; by which means the succussions are oftener repeated, and more strongly reverberated. Boiling, Dr. Cheyne observes, draws more of the rank, strong juices from the meat, and leaves it less nutritive, but lighter, and easier of digestion; roasting, on the other hand, leaves it fuller of the strong, nutritive juices, but harder to digest, and needing more dilution. Dr. Brown insists, that roasted meat is more easily digested, and every way more

fitted for a weak stomach than boiled. Strong and full-grown animal food should be boiled, and the young and tender roasted.

DRILLING. A modern mode of putting seed into the ground by a machine called a drilling machine, which makes channels in the ground, and lets the seed into them, so that it comes up in rows at regular distances from each other. The implement is also called the drill, and although a comparatively modern invention, is so constructed, as to be used for nearly all the seeds cultivated in the garden or the field. The advantages of drilling over the common method of planting, are, the business is performed more expeditiously, the seeds are more evenly distributed, and they are covered at the depth most suitable for their vegetation. The drill is used in some parts of



HORSE-DRILL.

England extensively for sowing wheat, and on the Holkham farm in Norfolk, belonging to the Earl of Leicester, four hundred acres in a season are put in by this implement. Where the drill is used, the soil must be fine, free from stones or other obstructions, and then drill-sowing is performed with the greatest accuracy and benefit. The Norfolk drill sows from twelve to sixteen rows of wheat at a time, and at a distance of eight inches. With the best drills now to be had in our own country, a man with two horses can sow a dozen acres of wheat in a day, and with one horse can plant twenty acres of corn in a day.

DRINK. A part of our ordinary food, in a liquid form, serving to dilute and moisten the dry meat. Although the proportion of

liquid to that of dry or solid food, cannot be precisely ascertained ; yet, if the constant secretion of the fluids be laid down as the basis of this computation, we should, perhaps, drink double the quantity of the solid provisions we daily consume. Nevertheless, even this proportion is but too often exceeded, merely to please the artificial cravings of a corrupted palate. Thus we no longer drink with a view to quench thirst only, but at certain hours of the day, whether we are naturally inclined or not. Nay we frequently meet with sots in beer, ale, spirits, wine, punch, and even tea. Excessive drink, however, though it distend and oppress the stomach, and thus impede digestion, is not nearly so pernicious as gluttony, unless the former be attended with intoxication. It however impoverishes the whole mass of the blood, by rendering it too thin and watery ; so that relaxation of the urinary and other canals, and, at length, general debility of the system, are its necessary concomitants.

On the contrary, too little drink disposes persons of a sedentary life to indigestion ; because many particles of solid food are, for want of dilution, passed unassimilated through the alimentary canal ; and the blood becomes viscid, and inert in its circulation. The active and laborious should, therefore, drink more than the idle or phlegmatic ; and either of these more in summer than in winter, to supply the great loss of humors exhaled by insensible perspiration. Persons, whose natural appetites are not depraved in consequence of irregular living, may easily regulate the due proportion of their drink to that of their solid food ; as, to them, thirst will be the safest guide. But those individuals who have become slaves to intoxicating libations are unfortunately deprived of this beneficent instinct, which is the privilege even of brutes, to drink what they need, and then to abstain from drinking.

DROMEDARY. A species of camel, called also the Arabian camel, with one bunch or protuberance on the back, in distinction from the Bactrian camel, which has two bunches. It has four callous protuberances on the forelegs, and two on the hind ones. It is a common beast of burden in Egypt, Syria, and the neighboring countries. It is said to be very swift, and able to travel more than one hundred miles in a day, though its common rate does not exceed forty miles.

DRONE. The male of the honey bee. It is smaller than the queen bee, but much larger than the working bee. The drones make no honey, but after living a few weeks, and being no further needed to impregnate the queen, by a wonderful instinct in the working portion of the family, they are killed or driven from the hive. An idler ; a sluggard ; one who earns nothing by industry is also called a drone.

DROWNING. The extinction of life by a total submersion in water. In some respects, there seems to be a great similarity between the death occasioned by immersion in water, and that by strangula-

tion, suffocation by fixed air, apoplexies, epilepsies, sudden faintings, violent shocks of electricity, or even violent falls and bruises. Physicians, however, are not agreed with regard to the nature of the injury done to the animal system, in any or all these accidents. It is indeed certain that, in all cases above mentioned, particularly in drowning, there is very often such a suspension of the vital powers, as to us has the appearance of a total extinction of them ; while yet they may be again set in motion, and the person restored to life, after a much longer submersion than has generally been thought capable of producing absolute death.

The length of time during which a person may remain in water without being drowned is very unequal in different individuals ; and depends as much on the temperature of the water as on the particular constitution of the subject. In general, however, there is less prospect of recovery, after having continued fifteen minutes immersed in water. In such cases, death ensues from impeded respiration, and the consequent ceasing of circulation of the blood, by which the body loses its heat, and with that, the activity of the vital principle. Dr. Goodwyn justly observes, that the water produces all the changes which take place in drowning, only indirectly, by excluding atmospheric air from the lungs, as they admit but a very inconsiderable quantity of fluid to pass into them during immersion. Hence we find that inflation of the lungs is one of the principal means of restoring life to those apparently dead from having been too long in the water.

DRUG. The general name of substances used in medicines, sold by the druggist, and compounded by apothecaries and physicians ; any substance, vegetable, animal, or mineral, which is used in the composition or preparation of medicines. It is also applied to dyeing materials. Any commodity that lies on hand, is not saleable ; an article of slow sale, or in no demand in the market, is frequently called a drug.

DRUM. A martial instrument of music, in form of a hollow cylinder, and covered at the ends with vellum, which is stretched or slackened at pleasure. In machinery, drum is a short cylinder revolving on an axis, generally for the purpose of turning several small wheels, by means of straps passing round its periphery. In anatomy, a portion of the ear is called the drum, or tympanum, or barrel of the ear. The membrane of the tympanum of the ear is tense, and closes the external passage of the ear, receiving the vibrations of the air.

DRUNKENNESS. Alcohol is the chief of the intoxicating substances ; but there are others besides it which produce a similar effect. Such are opium and bangué, hemlock, nightshade, henbane, and tobacco. Nitrous oxide gas, applied for a few seconds to the lungs by means of breathing, induces a transitory sort of intoxication. Opium and bangué are used in Mahometan countries, where the laws of the prophet prohibit the use of wine. Bangué induces a sort of

folly and forgetfulness, gaiety, and delirious joy. It and opium are, in truth, succedanea for wine; for, in all countries, men constantly seek after something or other to rouse and exhilarate their spirits, and bring on that mental state which relieves them from every care. This disposition, however, prevails most in cold climates; for drunkenness is observed to increase in proportion as we recede from the equator. The stimulus of heat being deficient, it would appear in cold climates, men feel more the want of another stimulus, and are thus led to the excessive use of intoxicating liquors.

The effects of inebriating liquors will be very different at different times. They will vary with the habit of intoxication, the fullness or emptiness of the stomach, the time of the day, the heat of the climate, the season of the year, the temperature of the room, and in short with whatever tends to vary the excitability of the system. Every person knows, that less liquor will produce intoxication in the forenoon than after dinner; and we learn from Captain Bligh's narrative, that when he and his companions in an open boat in their passage to Timor, were, from a scarcity of provisions, reduced to a state of almost continued fasting, a single teaspoonful of rum produced inebriation. This state of the system has been called accumulated excitability. But in typhus fever it seems to be in a state directly opposite; for then two or even three bottles of wine will sometimes be used in the four-and-twenty hours, and that too by delicate females, without inconvenience.

It is not uncommon to hear people say that they have known many hard drinkers live to a great age; and that if spirituous liquors be a poison, as physicians and moralists tell them that they are, they must indeed be a very slow poison, for such a person of their acquaintance has now attained his 80th year, for example, and yet has drunk hard all his life. This, however, is a very gross and most pernicious deception, much resembling the lists of remarkable cures said to be performed by quacks. You hear of those that have survived their prescriptions, but nothing of those who have perished.

We shall here put down a few of the most curious instances, of mental hallucination, that have been ascertained to proceed from excess in drinking. Athenæus tells us, that a drunken crew at Agrigentum in Sicily, hearing the winds roar on the house in which they happened to be, became so fully persuaded that they were on board ship, and in danger of suffering shipwreck, that they threw all the furniture out of the windows, under the idea that they were lightening the ship. A drunken man has been known to whip a post because it would not move out of his way; and an old gentleman of eighty, when intoxicated, once took a lamp-post for a lady, and addressed her in all the impassioned language of love. Junius mentions the case of a drunken man who was stopped in his progress by the shadow of a sign-post, which he thought it impossible to get over;

of a second, who seeing the moon shine through a small hole in the wall, attempted to light his candle at it; and, another that fell down drunk in the street, and when the people attempted to help him up, exclaimed, "What, can I not be quiet in my own room?"

DRY-ROT. This is a term applied to a rapid decay of any vegetable matter, when it has the appearance of being tolerably dry, but, in general, is applied only to timber when in that state, and is so named in contradistinction to the common mode of decay, by being exposed to the alternate states of wet and dry. There are a great many causes for this species of decay—some are quite simple, others are very complicated; yet, whatever may be the original cause, simple or compound, the effects are the same, namely, to render the timber useless, by destroying its elasticity and toughness, rendering it insufficient to resist any considerable pressure, and, indeed, for any of the useful purposes to which timber is applied. When timber is in a tolerably dry state, any means which will absorb or extract its oxygen from the other component parts will leave it in the state commonly called *dry rotten*. Moist, warm situations, with little or no current of air, are the most likely to generate this evil. The effluvia from timber in such a state of decay will rapidly carry its effects to the circumjacent timber, however dry it may appear; and any sort of timber will be, in a very little time, rendered quite useless.

There are no means of restoring rotten timber to a sound state, and the dry rot can only be cured by removing the decayed and affected parts, clearing all the fungi, and destroying its vegetating principle, with which the hard materials such as bricks or stone, may have been impregnated. For this purpose a strong solution of iron, copper, or zinc, is used with advantage. This, with the admission of a large quantity of air, is very advantageous. Many persons have written on the subject; and the nostrums proposed are as numerous as their authors. But no means of checking the evil can be depended upon, except that of removing the corrupted and contagious matter, and admitting a free circulation of air. Much also may be done by cutting timber in winter, and properly seasoning it, by steeping it in water for some time, and thoroughly drying it before it is used in building.

DUCK. A very extensive and natural genus of birds is represented by this name. They are known in all parts of the world. It has been divided by naturalists into an infinity of genera; to such a degree, indeed, that, according to some of the distinctions which have been made, it would be impossible to leave the females of several species in the same genus with the males. We have thirty-one species of this interesting genus, inhabiting North America, being within one of the number found in Europe—of these twenty-one are common to both countries, leaving ten peculiar to America, and eleven to Europe.

DUCTILITY. In physics, a property possessed by certain solid bodies, which consists in their yielding to percussion or pressure, and in receiving different forms without breaking. Some bodies are ductile both when they are cold, and when they are hot, and in all circumstances. Such are metals, particularly gold and silver. Other bodies are ductile only when heated to a sufficient degree; such as wax and other substances of that kind, and glass. Other bodies, particularly some kinds of iron, called by the workmen red-short, brass, and some other metallic mixture, are ductile only when cold, and brittle when hot. The degrees of heat requisite to produce ductility in bodies of the first kind, vary according to their different natures. In general, the heat of the body must be such as is sufficient to reduce to a middle state betwixt solidity and perfect fusion. As wax for instance, is fusible with a very small heat, it may be rendered ductile by a still smaller one; and glass, which requires a most violent heat for its perfect fusion, cannot acquire its greatest ductility until it is made perfectly redhot, and almost ready to fuse. Lastly, some bodies are made ductile by the absorption of a fluid. Such are certain earths, particularly clay. When these earths have absorbed a sufficient quantity of water, to bring them into a middle state betwixt solidity and fluidity, that is to the consistence of a considerably firm paste, they have then acquired their greatest ductility. Water has precisely the same effect upon them in this respect, that fire has upon the bodies above-mentioned.

DURATION OF PLANTS. The several kinds of plants vary very much in their degrees of longevity, some being annual, perfecting their growth within a year, ripening their seeds and perishing. Others are perennial and continue to grow and flourish for years and centuries. Warm or cold climates have much influence on the duration of plants, and in some few instances plants that are annual in cold climates, become perennial when transplanted into warm regions, and vice versa. There are some kinds of trees that are very short-lived, as the peach and the plum, others reach a great age as the pear and the apple. Some kinds of the forest trees are remarkable for their duration, and specimens are in existence seemingly co-eval with the date of the present order of things on our globe. The oak and chestnut or pine of our forests reach the age of from three hundred to five hundred years. The cypress or white cedar of our swamps has furnished individuals eight or nine hundred years old. Trees are now living in England and Constantinople more than one thousand years old, of the yew, plane and cypress tree varieties; and Addison found trees of the boabab growing near the Senegal in Africa, which, reckoning from the ascertained age of others of the same species, must have been nearly four thousand years of age. It may be remarked that plants of the same variety attain about the same age in all climates where they are produced.

DYEING. The origin of the art of dyeing is involved in that obscurity which pervades the history of all those arts connected with the common wants and necessities of life. They have originated in times beyond the reach of history or tradition, and are the offspring of the natural faculties of man directed by the great primeval wants of food, shelter, and raiment. The art of dyeing is, of course, posterior to many of these, and is founded less on the necessities than passions of mankind. A love of distinction is common to man in every stage of civilisation, but that passion for admiration which is displayed in a love of finery and ornament, is peculiar to him in his most barbarous and uncultivated state. Hence savage nations delight in brilliant and gaudy colors, and many paint their skins, and adorn themselves with feathers, stones, and shells of various hues. History has not furnished us even with her fables on the origin of dyeing; but from analogy, as well as observation of the practice of barbarous nations at the present day, we may trace the rude beginnings from whence the art has sprung. The rich and gaudy plumage of birds, the finely-spotted skins of animals, colored stones, and such other substances as nature herself supplies, would afford the first materials for savage finery and dress. The caps and mantles of the chiefs of the South Sea Islands, such as were brought home by Captain Cook, are composed almost wholly of feathers richly colored.

Purple has been almost every where a mark of distinction attached to high birth and dignity. It was an ornament of the first officers of Rome, but luxury, which was carried to great excess in that capital of the world, rendered the use of it common among the opulent, till the emperors reserved to themselves the right of wearing it. Soon afterwards it became the symbol of their inauguration. They appointed officers to superintend the manufactories, principally established in Phœnicia, where it was prepared solely for their use. The punishment of death was decreed against all who should have the audacity to wear it, though covered with another color. The penalty so tyrannically denounced against this whimsical species of treason, doubtless occasioned the loss of the art of dyeing purple; first in the West, but much later in the East, where it flourished considerably till the eleventh century.

The ancients had such a veneration for this color, that it was especially consecrated to the service of the Deity. Moses used stuffs of purple for the works of the tabernacle, and the habits of the priest. The Babylonians gave purple habits to their idols; it was the same with most of the other people of antiquity. The pagans were even persuaded that the purple dye had a particular virtue, and was capable of appeasing the wrath of their gods. Among the presents which the Israelites made to Gideon, the Scriptures make mention of purple habits found among the spoils of the kings of Midian. Homer gives us plainly to understand, that it only belonged to the princes to wear

this color, and we may remark, that this custom was observed by all the nations of antiquity.

EAGLE. A bird of prey, of the genus *falco*, of which there are several species. It is said to be the swiftest, strongest, and boldest of all birds. The eagle has a long hooked beak, yellow scaly legs, thick crooked talons, a short tail, and a very keen sight. The wings of the sea-eagle extend seven feet. The eagle, as a bearing in a coat armor, is reckoned as honorable among the birds, as the lion is among the beasts. The bald eagle is the national emblem of the United States of North America.

EARTHQUAKES. Shaking or vibrations of the ground are called earthquakes. They are sometimes accompanied by rents and rocking or heavings of the surface, so as to overthrow buildings, and swallow up towns and large tracts of country. They are attended with a terrible subterranean noise, like thunder, and sometimes with an eruption of fire or water, smoke or wind. They are occasioned by an electrical action between the atmosphere and some deep substrata; or the sudden formation of gaseous matter beneath the surface of the earth by internal volcanic fires. The great earthquake of 1755 extended over a tract of at least 4,000,000 of square miles. It appears to have originated beneath the Atlantic ocean, the waves of which received almost as violent a concussion as the land. Its effects were even extended to the waters in many places where the shocks were not perceptible. It pervaded the greater portions of the continents of Europe, Africa, and America; but its extreme violence was exercised on the southwestern parts of the former. Lisbon, the Portuguese capital, had already suffered greatly from an earthquake in 1531; and, since the calamity of 1755, has had three such visitations, 1761, 1765, and 1772, which were not however attended by equally disastrous consequences. This earthquake was also felt at Oporto, Cadiz, and other parts of Europe, and equally severe in Africa. A great part of the city of Algiers was destroyed. In many places of Germany the effects of this earthquake were very perceptible; but in Holland the agitations were still more remarkable. The agitation of the waters was also perceived in various parts of Great Britain and Ireland. At sea, the shocks of this earthquake were felt most violently. Among other catastrophes, the captain of the *Nancy*, frigate, off St. Lucas, felt his ship so violently shaken, that he thought she had struck the ground, but on heaving the lead, found she was in a great depth of water.

EARTHS. The earths that are of the most consequence to the agriculturist as constituting arable soils, are silica, lime, alumina, magnesia, oxyde of iron, and some few saline substances as sulphate and phosphate of lime. The arable soils or earths are produced by the decomposition of the rocks which form the basis of our globe, and their quality is depending on the proportion in which the several

ingredients enter into combination. Not one of these earths is of itself adapted to cultivation, and where any one is found in excess, sterility is the inevitable result. The best earths, or those best adapted to agriculture, are those that unite the properties most in demand by vegetables, and nearly in the proportion in which they exist in the most valuable plants. There is to be a distinction between earths and soils, though the difference is frequently overlooked or forgotten. The earths are made by the decomposition of the primitive elements of the globe; this material is converted into soil by the admixture and combination of animal or vegetable matter, and the fertility is usually depending on the proportion in which this is blended with the earths. The earths in some form exist in all plants; and by reducing them to ashes and submitting them to analysis the proportion and kind of earths may be ascertained.

EARWIG. There is an insect of this name, so called because it is supposed to insinuate itself into the ears of persons who incautiously sleep among grass where it is found. It is troublesome in Europe, but rarely found in the United States. It is extremely doubtful whether the animal intentionally enters the ear; and, indeed, there is no reason whatever that it should, except from mere accident.

EARTHWORM. This worm is the common angle worm of the fisherman; though apparently of little consequence to the agriculturist, is in some places found in such numbers as to prove somewhat of a nuisance. It is generally most abundant in moist lands, or in gardens that are heavily manured, and their presence may readily be known by observing the earth after rains, when numerous openings will be found, each accompanied by a small portion of earth apparently forced upward from the opening. There is a difference as to the effect they produce on the soil. Some have supposed they impoverish it by absorbing the nutriment that sustains the plant, although there is no proof that they feed directly on the roots. The opinion of others is that these worms benefit the soil by loosening it. If desired, they can be destroyed by lime or salt.

EAST. The point in the heavens where the sun is seen to rise at the equinox, or when it is in the equinoctial, or the corresponding point on the earth; one of the four cardinal points. The east and the west are the points where the equator intersects the horizon. But to persons under the equinoctial line, that line constitutes east and west.

ECHO. A sound reflected or reverberated to the ear, from some solid body. As the undulatory motion of the air, which constitutes sound, is propagated in all directions from the sounding body, it will frequently happen that the air, in performing its vibrations, will impinge against various objects, which will reflect it back, and so cause new vibrations the contrary way. Now, if the objects are so situated

as to reflect a sufficient number of such vibrations as proceed different ways, to the same place, the sound will be there repeated, and is called an echo; and the greater the distance of the object is, the longer will be the time before the repetition is heard; and when the sound, in its progress, meets with objects at different distances, sufficient to produce an echo, the same sound will be repeated several times successively, according to the different distances of these objects from the sounding body, which makes what is called a repeated echo.

ECLIPSES. These natural and now well understood phenomena were formerly beheld by mankind with terror and amazement; and were looked upon as prodigies which portended calamity and misery. Such fears, and the erroneous opinions that produced them, originated in ignorance. The illiterate in all ages have beheld eclipses with a kind of terror; and, not having been able to account for the obscuration of any of the celestial bodies, superstition has invented a thousand ridiculous stories to account for this seemingly wonderful exhibition of nature. The natives of Mexico kept fasts during eclipses, imagining the moon had been wounded by the sun in a quarrel. Other nations have thought, that in an eclipse of the sun, that body has turned away its face with abhorrence from the crimes of mankind; and, by fasting, they thought to appease the excited wrath. This ignorance and superstition were greatly serviceable to the celebrated navigator, Columbus. When he arrived at St. Domingo, on his fourth voyage of discoveries, in the year 1502, he had the mortification to find the Spanish governor, who resided there, would not allow his ships to anchor, because he was jealous of the favors which Columbus had received from Isabella, then queen of Spain. This obliged him to put to sea in search of some more hospitable harbor. After he had searched in vain for a passage to the Indian ocean, he returned, and was shipwrecked on the coast of Jamaica.

Being driven to great distress in consequence of the natives withholding a supply of provisions, he had recourse to a happy artifice, which not only produced the desired success, but heightened the favorable ideas the Indians had originally entertained of the Spaniards. By skill in astronomy, he knew there would shortly be an eclipse of the moon. He assembled all the principal persons of the district the day before the eclipse happened; and having reproached them for their caprice in withholding their assistance from men whom they had so lately and so highly respected, he told them the Great Spirit was so offended, at their want of humanity to the Spaniards, that as a sign he intended to punish them with extreme severity, and that as his vengeance was ready to fall on them, he would cause the moon that very night, to conceal its light, and appear of a bloody hue, the certain emblem of Divine wrath. This artifice was a most successful one. It led to the speedy supply of all his wants. Some of these

poor ignorant creatures did indeed hear his threat with indifference, while others listened to it with a degree of astonishment; but when the moon began gradually to be darkened, all were struck with fear. They immediately ran with consternation to their houses, and returned instantly, loaded with provisions.

EFFLUVIA. Fluxes, or exhalations of minute particles from any body; or emanations of subtle corpuscles from a mixed sensible body by a kind of motion of transpiration. Odoriferous bodies every one knows, are continually emitting substantial effluvia, by means of which they excite in us the means of smelling. These minute effluvia are sometimes perceived by the eye, in form of fumes and vapors.

Some bodies are found to emit effluvia for a great number of years, without any considerable loss, either as to bulk or weight; as different odorous bodies, the tenuity of whose emanant corpuscles is incredible; not but that the loss they sustain by the continual emission of effluvia may be made up to them by the reception of other similar effluvia of the same kind of bodies diffused through the air. That affluvia are emitted to very great distances, we have a notable proof in odoriferous effluvia being in many cases perceived at the distance of many leagues. Again, that the generality of effluvia retain the proper color, smell, taste, and other properties and the effects of the bodies whence they proceed, and this even after they have passed through the pores of other solid bodies, we have abundant proof.

EGGS. Eggs differ very much according to the birds that lay them, as to their color, form, bigness, age, and the different way of dressing them; those most used in food are hen's eggs; of which, such as are new laid are best. As to the preservation of eggs, it is observed, that the egg is always quite full when it is first laid by the hen, but from that time it gradually becomes less and less so, to its decay; and however compact and close its shell may appear, it is nevertheless perforated with a multitude of small holes, though too minute for the discernment of our eyes, the effect of which is a daily decrease of matter within the egg, from the time of its being laid; and the perspiration is much quicker in hot weather than in cold. To preserve eggs fresh, there needs no more than to preserve them full, and stop the transpiration; the method of doing which is, by stopping up the pores with matter which is not soluble in watery fluids; and on this principle it is, that all kinds of varnish, prepared with wine, will preserve eggs fresh for a long time, if they are carefully rubbed all over the shell; tallow, mutton fat, and even fresh butter, are also good for this purpose; for such as are rubbed over with any of these will keep as long as those coated over with varnish.

The art of hatching chickens by means of ovens has long been practised in Egypt, chiefly in a village named Berme, and its environs. About the beginning of autumn, the natives scatter themselves all over the country; where each undertakes the management of an oven. These ovens are of different sizes, but in general they contain from 40,000 to 80,000 eggs, and they usually keep them working for about six months; as, therefore, each brood takes up in an oven, as under a hen, only twenty-one days, it is easy in every one of them to hatch eight different broods of chickens. Every Bermean is under the obligation of delivering to the person furnishing him with eggs, only two-thirds of as many chickens as there have been eggs put under his care; and he is a gainer by this bargain, as more than two-thirds of the eggs usually produce chickens. This useful and advantageous method of hatching eggs was discovered in France by the ingenious M. Reamur; who, by a number of experiments, reduced the art to fixed principles.

ELECTRICITY. The surface of the earth, and of all the bodies with which we are acquainted, is supposed to contain or possess a power of exciting or exhibiting a certain quantity of an exceedingly subtile agent, called the electric fluid or power. The quantity usually belonging to any surface, is called its natural share, and then it produces no sensible effects; but when any surface becomes possessed of more, or of less, than its natural quantity, it is electrified, and it then exhibits a variety of peculiar and surprising phenomena ascribed to the power called electric. If you take a stick of sealing-wax and rub it on the sleeve of your coat, it will have the power of attracting small pieces of paper, or other light substances, when held near them. If a clean and dry glass tube be briskly rubbed with the hand, or with a piece of flannel, and then presented to any small light substances, it will immediately attract and repel them alternately for a considerable time. The tube is then said to be excited. If an excited glass tube, in a dark room, be brought within about half an inch of the finger, a lucid spark will be seen between the finger and the tube, accompanied with a snapping noise, and a peculiar sensation of the finger. Dry flannel clothes, when handled in the dark, frequently exhibit a sparkling appearance, attended with the same kind of noise that is heard in the experiment of the glass tube.

All those bodies which transmit or conduct electricity from one surface to another, are called conductors, and those surfaces that will not transmit the electric power, are called electrics or non-conductors. The general class of conductors comprehends metals, ores, and fluids in their natural state, except air and oils. Vitrified and resinous substances, amber, sulphur, wax, silk, cotton, and feathers, are electrics or non-conductors. Many of these, such as glass, resin, and air, become conductors by being heated. When a surface is supposed to

have more than its natural quantity of this fluid, it is said to be positively electrified; and when less than its natural share, to be negatively electrified. When an electrified conductor is wholly surrounded by non-conductors, so that the electric fluid cannot pass from it along conductors to the earth, it is said to be insulated. The human body is a good conductor of electricity; but if a person stand on a cake of resin, or on a stool supported by glass legs, the electric fluid cannot pass from him to the earth, and if he is touched by another person standing on the ground, the same sparkling appearance and noise, as mentioned above, will be exhibited. Two surfaces, both positively, or both negatively electrified, repel each other; and two substances, of which one is positively, and the other negatively electrified, attract each other.

The effect of electricity on vegetation has not received that attention which it probably deserves. That plants push forward much faster where the electric currents are active is well known to the scientific farmer; but how far this new agent may be used to hasten vegetation is not generally understood. Some experiments seem to show the power to be very great. Thus by sowing the seeds of cresses in a suitable earth, watered and of a proper temperature, and applying the voltaic battery, the seeds are germinated, and the plants fully developed in a few days; and very similar effects are produced on other seeds. Hence, it may be inferred, that all vegetation owes perhaps its very existence to currents of this fluid, and if man is able to produce or control them, they may be made of essential service. The effect of electricity in hastening vitality in the embryo of animals is not less striking. The eggs of the common fowl require from twenty to twenty-five days to produce the young, according to the temperature. By exposing them to the electro-magnetic current, the young are hatched in five or six days; and some of our readers are doubtless aware of the result of Mr. Cross's experiments, in which insects were repeatedly produced by the passage of the current through silicate of potash.

ELEMENT. In Physiology, a term used by philosophers to denote the original component parts of bodies, or those into which they are ultimately resolvable. It seems to have been an opinion established among philosophers in the remotest ages, that there are only four simple bodies, namely, fire, air, water, and earth. To these they gave the name of elements, because they believed that all substances are composed of these four. This opinion, variously modified indeed, was maintained by all the ancient philosophers. We now know that all these supposed elements are compounds; fire is composed of caloric and light; air of caloric, oxygen and azotic gases; water of oxygen and hydrogen; and the earth includes ten different substances.

ELEPHANT. The human race excepted, the elephant is the most respectable of animals. In size he surpasses all other terrestrial

creatures, and in understanding he is inferior only to man. Of all the brute creation, the elephant, the dog, the ape, and the beaver, are most admirable for their sagacity ; but the genius of the dog is only borrowed, being instructed by man in almost every thing he knows ; the monkey has only the appearance of wisdom, and the beaver is only sensible with regard to himself, and those of his species. The elephant is superior to them all three ; he unites all their most eminent qualities. The hand is the principal organ of the monkey's dexterity ; the elephant with his trunk, which serves him instead of arms and hands, with which he can lift up, and seize the smallest, as well as the largest objects, carry them to his mouth, place them on his back, hold them, or throw them far off, has the same dexterity as the monkey, and at the same time the tractableness of the dog ; he is like him susceptible of gratitude, and capable of a strong attachment ; he uses himself to man without reluctance, and submits to him, not so much by force, as by good treatment ; he serves him with zeal, intelligence, and fidelity ; in fine, the elephant, like the beaver, loves the society of his equals, and makes them understand him.

In regions where our cannons and murdering arts are yet scarcely known, men fight still with elephants. At Cochin, and in parts of Malabar, they do not make use of horses, and all those who do not fight on foot are mounted upon elephants. In Tonquin, Siam, and Pegu, the king, and all the grandees, never ride but upon elephants ; on festival days they are preceded and followed by a great number of these animals richly caparisoned, and covered with the richest stuffs. On comparing the relations of travellers and historians, it appears that the elephants are more numerous in Africa than in Asia ; they are there also less mistrustful, not so wild, and, as if they knew the unskilfulness and the little power of the men with whom they have to deal in this part of the world, come every day without fear to their habitations.

If the elephant is vindictive, he is no less grateful. A soldier of Pondicherry, who commonly carried to one of these animals a certain measure of arrack every time that he received his pay, having one day drank more than common, and seeing himself pursued by the guard, who threatened to conduct him to prison, took refuge under the elephant, and slept there. It was in vain that the guard attempted to draw him out from his asylum ; the elephant defended him with his trunk. The next day the soldier, become sober, was struck with terror to lie under an animal of this enormous bulk. The elephant, who, no doubt, perceived his consternation, caressed him with his trunk, to remove his fears, and made him understand that he might depart freely.

ELK. This animal dwells in the northeastern parts of Europe, in Asia, and North America, chiefly frequenting the colder climates. In the latter country it is called the moose deer, or wampoose by the

natives. It is said to consist of two kinds, the real elk or moose deer, which is larger than the tallest horse, and has been eight or ten feet high, of a dark gray color, sometimes black, but much paler on the legs and beneath the tail; the hair is long and coarse, ten or twelve inches in length on the ridge of the back, and forming a kind of mane on the upper part of the neck. There is a sort of carbuncle or excrescence pendent from the throat of some; but it is not ascertained whether this is a general characteristic of the animal, or belongs only to the male. The tail is short, the eyes and ears are large and erect, and the hoofs broad. But the elk is chiefly distinguished by two wide spreading palmated horns of great size, proceeding from the forehead, between two and three feet long, or even between four and five in those of the greatest size; and they have undoubtedly been seen in recent instances, though not so large, yet of such dimensions as to enable us to admit the probability of the fact.

It is probable that some species of these animals are extinct, unless they remain in the recesses of those forests as yet unexplored by the modern races of men. But we know from undoubted evidence, that they once dwelt in countries, where they no longer exist, nor does any tradition of them now remain. Horns of enormous size are frequently discovered near the surface of the earth, or far below it, which the present elk, though its neck be of great strength, would almost seem incapable of supporting. Nor is it less singular, that such remains are often associated with those of other animals so different in nature, as to render it doubtful whether the living race of both could survive together.

ELM. There are about twenty species of the elm; all inhabiting the temperate parts of the northern hemisphere, and three of them natives of the United States. The American white elm is found mostly from the forty-ninth to the thirtieth parallel of latitude, is abundant in some of the Western States, and extends even beyond the Mississippi. This tree often rises to the height of one hundred feet, with a trunk four or five feet diameter. At the height of fifty or sixty feet it separates into a few primary limbs, which gradually diverge, diffusing on all sides long, arched, pendulent branches, gracefully but majestically floating in the air. In many parts of the eastern and middle States these trees are highly esteemed for their venerable appearance, and for the refreshing shadows from their thick foliage in the hot days of summer. When found on the public grounds of the quiet village, in the spacious squares of the densely populated city, and about the secluded country mansion, there is a rural magnificence, and a delightful playing of the winds, which cannot fail being appreciated by the lovers of nature and by all of good taste.

ENDOGENOUS. In some plants the additions made to their growth takes place from the interior of the plant, and in some from

the exterior. In the first case the plant is called *endogenous*, and in the last, *exogenous*. All trees belonging to the family of palms, the date, cocoa-nut tree, bread-fruit tree, the bamboo, sugar cane, and indeed most of the trees belonging to tropical climates, as well as all gramineous and lilaceous plants, are endogenous. On the contrary, most of the trees of temperate or northern regions, such as the oak, pines, and elms, and the various fruit trees, are exogenous. In the first, each successive addition is made from within, like drawing out an additional slide to a telescope; in the last the addition is made between the bark and the wood of the previous year's growth, and these successive layers determine the age of the tree, as the joints of the palm do that class. The stems of endogenous plants, after they become consolidated, never increase in size; they can only increase in height; while the exogenous ones continue to increase in circumference as well as in height during their whole life.

ENRICHING-PLANTS. A term used by Tull and other farmers to designate such plants as are found to improve land, rather than to exhaust it, and in consequence of which the same piece of land will produce a good crop of corn, though it would, without the assistance of their having been planted on it, have yielded a very poor one. The mystery of this difference between plants, some of which are found to burn up, that is, impoverish lands, while others enrich it, and leave it fitter for succeeding crops than they found it, is explained by Mr. Tull. This author having observed, that breaking the earth, by digging or horse-hoeing between the plants, gave them great increase, found that it was this practice that enriched the earth; and that, while corn and such plants as stand close, and cannot be hoed between, impoverish the ground, and suffer no means of enriching it again to be used, there were some other things, the crops of which being planted thinner, gave room to the earth to be ploughed, dug, or hoed between, and that these were the plants which were called the enriching kinds by farmers; and the whole secret lay in this, that the hoeing, ploughing, or otherwise breaking the earth between them, in order to kill the weeds, enriched the ground greatly more, in proportion, than these plants exhausted it; and the consequence was, that though they had thriven very well, yet the earth was left richer than before, notwithstanding all that they had imbibed from it.

EPIDERMIS. In botany the exterior cellular coating of the bark, leaf, or stem of plants or trees. It is composed of cells compacted together into a stratum, varying in thickness in different species, and is often readily separable by gentle violence. It is believed to be intended by nature as a protection of the subjacent parts from the drying effects of the atmosphere.

ERA. An account of time, reckoned from any particular period, term, or epoch. The Jews had several eras, as from the creation of

the world, from the universal deluge, from the confusion of languages, from Abraham's journey to the land of Canaan, from the departure of their forefathers out of Egypt, from the building of Solomon's temple, and from the Babylonish captivity. The ancient Greeks reckoned time by Olympiads, which were public games celebrated every fifth year; the first Olympiad they placed in the year of the world 3187. The ancient Romans reckoned from the building of their city, which was in the era of the world 3113. The Christians take their era from the birth of our Saviour, this method of computing time commencing among them, about the beginning of the seventh century. The Mahometans compute their time from Hegira or flight of their prophet, in the year of our Lord, 617; subtracting this number (617) from the Christian year, the remainder will be the Mahometan year.

ERGOT. This is an elongated irregular excrescence, curved and dark colored, sometimes found growing on the heads of several of the cultivated grasses, particularly rye, and the smooth stalked June grass. It most commonly appears in hot, damp summers. It is known to be present by the change which the grains assume; but these seldom exceed five or six in an ear. The ergotted grains have a heavy, unpleasant odor, and an acrid, nauseous taste, leaving a slight sensation of heat in the palate. Ergotted rye is poisonous both to man and other animals. When in bad seasons, it has prevailed, and has been ground into flour with the rye, and baked into bread, it has caused many fatal, depopulating diseases in the north of Europe. On quadrupeds its use is followed by emaciation, palsy of the hind legs, and extreme debility; mules in South America lose their hoofs and hair when fed on ergotted maize; and hens who have ergotted rye mixed with their food lay eggs without shells, owing to its excitement of the oviduct. It is employed as a medicine in difficult parturition, but it ought not to be administered without great caution and discretion. Ergot is not so prevalent in this country as to occasion great loss to farmers.

ESSEX HOGS. In England is a breed of swine, known by this name and much admired. Youatt says the Essex pigs have been indebted for their improvement to crosses with foreign breeds, and especially the Neapolitan, and with the Berkshires. They are mostly black and white, the head and hinder parts being black, and the back and belly white; have smaller heads than the Berkshire pigs, and long thin upright ears, short hair, a fine skin, good hind quarters, and a deep round carcase; they have small bones, and the flesh is delicate and well flavored. Lord Western's stock of these hogs is entirely black, and is distinguished by having tea⁴-like appendages of the skin depending from the upper part of the neck, which are commonly termed wattles. Some of these animals have reached the

weight of nearly five hundred pounds. It is stated that he has done much to improve the Essex; and, that the pigs are much sought throughout the British realm.



ESSEX HOG.

EVAPORATION. The volatilization of a fluid by means of heat, with access of air, in order to diminish its fluidity, or to obtain any fixed salts it may hold in solution, or diminish the quantity of a residuum. In this manner, the water of the sea is evaporated, and the salt obtained, and decoctions made into extracts. Evaporation is one of the great chemical processes, by means of which Nature supplies the whole vegetable kingdom with the dew and rain necessary for its support. Hence, it takes place at all times, not only from the surface of the ocean, but also from that of the earth. Nor is it confined to these; it is even carried on from the leaves of trees, grass, and flowers, with which the earth is covered. Great part of the water which is thus raised, descends again during the night, in the form of dew; being absorbed by those vegetables which yielded it before.

One of the most beneficial effects of evaporation, is to cool the earth, and prevent it from being too much heated by the sun. This property of producing cold by evaporation, has but lately been observed by chemists, who have accordingly availed themselves of it in its fullest extent; though their mode of procuring cold, by means of those expensive fluids, ether and spirits of wine, can only be employed

by way of experiment. The most simple method, however, of producing cold by the evaporation of water, may be applied to various useful purposes, especially in warm countries; thus sailors are accustomed to cool their casks of liquors, by sprinkling them with seawater.

Dr. Darwin justly observes, that the evaporation of moisture from the surface of the earth, produces so much cold as to injure those terrestrial plants, which are too long covered with it. Hence, such parts of wall trees as are sheltered from the descending dews, by a coping stone on the wall, are not so liable to be injured by frosty nights; because they are not made colder by the evaporation of the dew, and also have less water to be congealed in their vessels, and to burst them by its consequent expansion.

EVERGREENS. Are a species of perennials, that preserve their old leaves a long time after the formation of the new, and do not drop them at any determinate time. In general, the leaves of evergreens are harder, and less succulent, than those which are renewed annually. The trees are generally natives of warm climates; and the common evergreens are those belonging to the pine and spruce families, of which the white pine, hemlock, black spruce, yew trees, fir balsam, and arbor vitæ, may serve as specimens. In ornamental planting, evergreens are very desirable; and where they can be successfully transplanted constitute one of the greatest beauties of the landscape. Their rich foliage amid the frosts and snows of winter is inimitably rich and magnificent. Some herbaceous perennials, as the house-leeks, and naval-worts, enjoy the same privilege with the evergreen trees, and resist the severities of winter; some can even exist out of the earth for some time; being replete with juices, which the leaves imbibe from the humidity of the atmosphere, and, which, in such plants, are of themselves sufficient for effecting the purposes of vegetation. For this reason, unless in excessive hot weather, gardeners seldom water fat succulent plants, as the aloes, which rot when they are moistened, if the sun does not quickly dry them. The leaves of all the evergreen shrubs and trees have a thin compact skin over their surface, as is easily discovered by macerating them in water, to separate the parenchyma, or pulp, from the vessels of the leaves; which cannot be effected in any of these evergreens till a thin parchment-like cover is taken off. They are found by experiment to perspire but little, when compared with those which shed their leaves; and it is, perhaps, principally owing to this close covering, that they retain their verdure, and continue through the winter on the trees. The nutritive juices of these plants always abound, more or less, with an oily quality, which secures them from being injured by severe frost, so that many evergreens grow in the coldest parts of the habitable world.

EXCRETIONS. From experiments that have been made by

Decondelle and others, and repeated by Leibig, it is established beyond all question that the roots of plants throw off an excrement during the progress of their growth, and that the excrement of each plant is peculiar to itself. And further, that the presence of such matter in a soil, impedes the growth of plants of the same kind, whilst in some instances it becomes a source of nourishment to others. This fact is used as an argument, among other known reasons, in favor of a rotation of crops. And much will depend upon the nature and character of the soil itself as to what time should elapse before a certain crop may be successfully repeated.

EXHALATION. Generally speaking, denotes effluvia or steams, which arise from the surface of the earth, or other bodies, in the form of vapor. Plants and flowers afford a grateful exhalation, provided their fragrance be not too strong; hence they should never be placed in confined apartments, as instances have occurred of persons being almost suffocated, by sleeping in rooms where quantities of fresh flowers were exposed. In serene weather, however, fresh plants or evergreens (but by no means flowers) may be strewed with advantage, during the day, in the apartments of valetudinarians; as such vegetables, especially in sunshine, generate a vital air, which produces salutary effects on the lungs.

The exhalations arising from vast numbers of burning candles, as also from the breath of many persons respiring in the same room, are peculiarly unwholesome to weak and consumptive habits. This inconvenience may, however, be remedied by means of conical tubes, the funnels or broad ends of which should be placed so as to communicate in or above the windows, with the open air; thus the latter will be impelled into the rooms with considerable force, and ventilate them more effectually, and at much less expense, than is accomplished by fumigations or other methods. The vapor arising from charcoal is particularly hurtful, and, in close apartments, often productive of fatal accidents. The greatest precaution is therefore requisite, when charcoal is employed for culinary or domestic purposes. In a similar manner humid air of every kind is very detrimental to health; and we seriously reprobate the keeping of damp linen, wet clothes, and even wet umbrellas, in dwelling-rooms; as, by paying due attention to this circumstance, many serious accidents might easily be prevented.

EXOTIC. An appellation for the produce of foreign countries. Exotic plants are such as belong to a soil and climate entirely different from the place where they are raised, and therefore can be preserved for the most part only in green-houses. Exotic plants of the hot climates are very numerous, and require the utmost attention of the gardener. Even if they can be brought to blossom, it is rare that they produce fruit, and still more rare that the seeds ripen. It is only by care and accurate observation of their nature and wants, that

some of them can be acclimated, or made to flourish on the foreign soil.

EXUVIÆ. Formed from *exure*, to put off, to divest ; in Physiology, transient parts of certain animals, which they put off, or lay down, and assume new ones. Such, especially, are the skins or sloughs of serpents, shells of lobsters, and the like ; which are annually changed, and renewed in the spring. The outer integument of the body, which in man and other large animals is so durably fixed on the body, is in many of the animals of the reptile kind much more loosely fixed, and is changeable several times during the period of their lives. The serpent kind all shift their skins several times in their lives, and the water-newt has been lately observed to do the same ; but no creature in the world does it so often as the caterpillar, almost every species of these insects throwing off their old skin once in ten or twelve days, or less ; and this in such a manner as is extremely worthy of an attentive observation. Malpighi observed that the common silk-worm changed its skin four times during its continuance in that state, the first of these changes happening at eleven or twelve days from its appearance from the egg, and the others at the distance of five or six days each ; and probably the rest of the caterpillar kind observe nearly the same periods.

Neither is this change of the skin confined to the few creatures we have mentioned ; but among the whole insect class, the most numerous of that of all animated beings we know, there is scarcely one species, every individual of which does not throw off its skin, once at least, before it arrives at its full growth. The term changing the skin is scarcely expressive enough for this operation in the caterpillar kinds ; for the creature throws off the external covering of even the minutest part and organ of its body, and the skins they thus deposit have so much the appearance of a complete insect, that they are very often mistaken for such, presenting us with every thing that we see in the external appearance of the living animal.

EYE. In anatomy, the organ of sight, or that part of the body whereby visible objects are represented to the mind. The term eye is used in a great variety of senses. In architecture, it signifies an aperture at the top of a dome, also the centre of a volute ; in agriculture, it means either a little bud or shoot, ingrafted into a tree, or the part of a potato cut off for seed ; and in printing it is used for the graving in relieve on the top of the letter. In a symbolical sense, there is no term of which so much use is made to denote the operations of the understanding and the affections.

EYELID. The eyelid is the external covering of the eye. Its peculiar adaptation to its proper offices cannot be sufficiently admired. It forms the cover which closes the eye during sleep, when it remains motionless for hours ; it serves the purpose of wiping and cleansing the ball of the eye, as well as moistening it by spreading the tears

over its surface, for the performance of which offices it is, during the waking hours, in incessant motion. It screens the eye also from excessive light, which might often be injurious or destructive to it. The sympathy between the eye and its lids is very close, as was absolutely necessary to their proper action; and this is so much the case, that in weakness of the nerve of the eye, the smarting, which warns us to close them, is always felt in the lids. Their diseases, like those of the eye, are various, but of minor importance.

FAGOT. In agriculture, is a bundle of any sort of small wood tied up closely together by means of a withe, or other kind of ligature. They are mostly made up from the cuttings or thinnings of underwoods, coppices, and hedges, being sold in many districts to the bakers, for the purpose of heating their ovens. They usually fetch a good price in many situations, especially near large towns. In making up these bundles the workmen trim off the superfluous spreading branches from the sides and ends, which gives them a neater appearance. These trimmings are put in the middle of the fagots which are to be made up, by which they appear to greater advantage.

These trimmings are of little or no use in the fagots, and ought to be left on the ground; for being small, they would soon rot there, and would manure the ground so as to be of more advantage to the next growth than is easily imagined. The leaves of the trees falling to the earth, manure it very much; but this is nothing to the advantage of these little pieces of wood; any rotten wood, but in a moderate quantity, will turn a common bad earth into good garden mould, and the growth of young trees is more forwarded by this manure where it is left, than by any other means that can be used to it. We always see the land where wood-stacks have stood enriched to a surprising degree by them, and the same advantage will occur wherever wood of any kind is left to moulder and rot upon the ground. That sort of small wood which is bound up in fagots is called fagot-wood, and sometimes bush-wood.

FAIR. In England, a greater kind of market granted to a town, by privilege, for the more speedy and commodious buying and selling, or providing such things as the place stands in need of. It is incident to a fair in England, that persons should be free from being arrested in it for any debt, except that which has been contracted in the same, or, at least, promised to be paid there. There is a toll usually paid at fairs, for the privilege of erecting stalls, from which to sell goods, as well as booths, either for entertainment or pastime. The most important fairs now held are probably those of Germany, and particularly the Leipsic fairs. In German, a fair is called *Messe*, which also signifies a mass. High masses, on particular festivals, collected great numbers of people, and thus, probably, became the origin of markets, and, at a later period, of fairs, which as we have already said, are only privileged markets.

The most important fairs, in this country, are those for the exhibition of agricultural productions and of specimens of skill in the mechanic arts, and in domestic economy. They are intended not so much for selling the articles produced, as for comparing them together, to see who, in his own efforts, has been most successful. The motive for such comparison is to obtain premiums or testimonials for cases of rare excellence in the rearing of animals, in the products of the farm and garden, and in whatever is manufactured, whether in the family or the workshop. The moral influence of agricultural fairs especially is of the first importance. By attending them, each one of our farmers is stimulated to embark in all experiments made by others, which have been found advantageous. Each witnesses the perfection which may be attained in the improvement of farm animals, whether in cattle, horses, swine, sheep, and even poultry; and is enabled to note the profit arising from them, above what is experienced where such improvement has not been made. Each witnesses the saving of labor in the use of the best constructed agricultural implements, and becomes resolved to adopt them. And each, without cost to himself, is enabled to avail himself of all that his more enterprising brethren have achieved by a free use of capital, and a long period of study and persevering labor. In a word, each becomes possessed of what all others know without paying for it.

FALCON. A bird of prey, once much esteemed as an auxiliary of the savage arts of man, in destroying the feathered race. Falcons were formerly tamed and trained, just as pointer-dogs are at present trained; and hawking or falconry, was, to a certain class of minds, as interesting as shooting or hunting is to the same class in our days. They are carnivorous, the beak hooked, and the head covered with feathers, and the legs and feet scaly.

FALLOW. A term applied to land which is left uncultivated for one or more years, with a view to exterminate weeds, and to enable it to fix those atmospherical elements which promote vegetable growth, and which are exhausted by repeated crops of the same kind, though the same effect is produced by the rotation of a crop for man, and a crop for beasts.

FALLOW-DEER. No two animals can be more nearly allied than the stag and the fallow-deer; and yet no two animals keep more distinct, or avoid each other with more fixed animosity. They are never seen to herd in the same place; it is even rare, unless they have been transported thither, to find fallow-deer in a country where stags are numerous. They seem to be of a nature less robust and less savage than the stag; they are found but rarely wild in the forests, and are bred up in parks, where they are, as it were, half domestic.

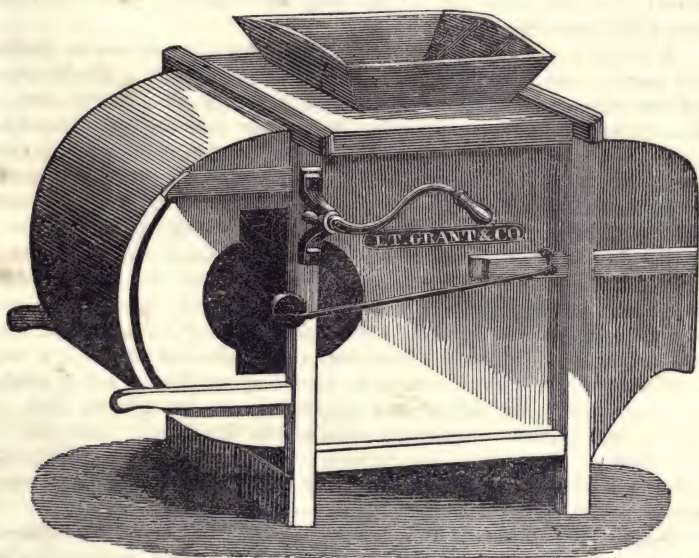
England is the country of Europe where they most abound; and there their flesh, which dogs are observed to prefer to that of all other animals, is held in no small estimation. It seems to be an animal

formed for a temperate climate ; for it is never found in Russia, and very rarely in the forests of Sweden, or in any other northern country, and as the fallow-deer is less savage, more delicate, and, indeed, it may be added, more domestic than the stag, it is likewise subject to a greater number of varieties. Besides the common deer, and the white deer, we know of several other kinds still ; and the deer of Spain, for example, which are always as large as stags, but whose neck is more slender, whose color is more obscure, and whose tail is rather black than white underneath, and longer than that of the common deer ; the deer of Virginia, which are almost as large as those of Spain ; other deer, whose forehead is compressed and flattened between the eyes, whose ears and tail are longer than those of the common deer, and of whose hind legs the hoofs are marked with a white spot ; and others, which are spotted or streaked with white, black, and yellow ; and others still, which are entirely black. The horns of the buck, like those of the stag, are shed every year, and take nearly the same time for repairing.

It frequently happens, that a herd of fallow-deer is seen to divide into parties, and to engage each other with great ardor. Each seems desirous of gaining some favorite spot of the park for pasture, and of driving the vanquished party into the coarser and more disagreeable parts. Each of these factions has its particular chief, namely the oldest and the strongest of each herd. These lead on to the engagement ; and the rest follow under their direction. Their combats are singular enough, from the disposition and conduct by which their mutual efforts seem to be regulated. They attack with order, and support and assault with courage ; they come to the assistance of each other ; they retire, they rally, and never yield the victory upon a single defeat. The combat is renewed every day, till at length the most feeble side is obliged to give way, and is content to escape to the most disagreeable part of the park, where alone they can find safety and protection. The fallow-deer may easily be brought to live in stables, and seems to acquire an affection for the horse. One which was kept at Newmarket in England, used to delight in galloping round the course with the racers while the jockeys were exercising them.

FANNING MILL. This is a contrivance employed for separating, by an artificial current of air, the chaff from the grain, after it has been threshed out of the straw. The importance of this contrivance must be apparent to every one who has seen the slow and tedious process of a separation without the aid of a Fanning Mill, where perhaps the farmer would have to wait day after day, subsequent to the threshing of his grain, before he could have the benefit of natural breezes to effect it ; and, even when Boreas seemed propitious to his wishes, the operation was painfully protracted. All know the winds, like the passions of man, are fickle in the extreme ; one moment rapid

and the next moment slow, and then anon not perceived at all. There are various accounts given of the first introduction of the Fanning Mill; and there are sundry claimants for the honor of the invention. It is probably pretty generally admitted that the idea or design of the first used in England and Scotland was obtained from Holland; but there has been a succession of improvements upon it. In the United States there have been patents for several different mills, each having its own admirers, and each having, probably, some peculiar merit not belonging to the others. It is very obvious, that in addition to a thorough and expeditious separation of the grain from the chaff, it is important that there should be in a Fanning Mill simplicity and durability of construction, so as to prevent liability for getting out of order; or, if by accident it becomes broken or deranged the proprietor or any common mechanic may repair it.



FANNING MILL.

FARMING. Signifies the art of managing, or general detail of the business of a farm. It is an employment of considerable difficulty and trouble, as requiring constant care, united with great activity and judgment. In order to conduct it with propriety and advantage, it demands an intimate practical knowledge of the various sorts of cultivation and management which are in use, as well as of

the nature and value of every description of live stock ; likewise a perfect acquaintance with the various methods of buying and selling, and the constant state of different markets and fairs. And, besides these, there are other minutiae which are of equal importance to the success of the farmer. The advantages of farming differ materially according to the nature, situation, and circumstances of farms as well as the care and management that are bestowed upon them.

FARRIER. Is the designation of the smith who devotes his attention chiefly to shoeing horses, and to curing them of all kinds of diseases. It was probably owing to the opportunities afforded to the smiths, while shoeing horses, of observing the various diseases of the foot, and consequently of haranguing on the subject, that they, in time, acquired an undue reputation for perfect ability in not only that particular, but for a general knowledge of whatever related to the animal at large.

FARINA. This is an article of food manufactured from the flour of wheat, and usually cooked for a desert on the dinner table. It is a new mode of using wheat, and is becoming very popular. One house in New York manufacture 800,000 pounds annually, which requires 80,000 bushels of wheat ; a bushel of the grain furnishing only ten pounds of farina, the rest of the wheat being converted to other purposes. Hence, it is seen that farina is made only from the finest portion of the flour of wheat ; and, the process of producing it is a long one ; the grain passing through eight different run of stones, every one of them bearing its part in breaking the kernels and reducing the particles to the required size, the different parts being separated also thereby ; and finally it is screened by passing through a hand-seive.

FAT. An oily matter contained in the cellular substances of animals, of a white or yellowish color. It seems to answer several important purposes ; it facilitates the motion of the various parts where it is lodged ; it fills up interstices in different situations ; and as it is a bad conductor of heat, it appears to contribute to the preservation of the temperature of animals. It is used with other animal substances as an article of food ; and where the digestive powers are strong, it proves highly nutritious. Those animals which sleep all the winter, are generally fat at the commencement of their long slumber, and come out of it very lean, owing to the fat having been absorbed and carried into their system for the purpose of nutrition. Fat has a tendency to accumulate very much in some persons who live luxuriously, using great quantities of animal food, with porter and other malt liquors, and who take little exercise. Others without such causes, seem to get corpulent from peculiarity of constitution. It sometimes proceeds to such an extent as to be a real disease, incapacitating the individual from exercise and from performing the duties of life, besides rendering him liable to apoplexy and other diseases

analogous to it. Such overgrowth of fat is to be counteracted by abridging the quantity of food taken, by abstaining from malt liquors, and by taking constant and regular exercise. Instances are upon record, of persons who have made a sudden and total change in their manner of life, in order to diminish their corpulency ; and this without any bad effects : but such sudden transitions from one mode of life to another are not advisable, and it is better to make them gradually, but steadily.



FAT-RUMPED SHEEP.

FAT-RUMPED SHEEP. This is a variety of sheep that has from the earliest times inhabited the countries over which the patriarchal shepherds roamed. It is but little known in Africa, but prevails extensively in the north and south of Asia ; is found in Palestine in greater numbers than any other breed, and reaches far into the interior and northern parts of Russia. It is the purest in the deserts of Great Tartary, no other variety being near to contaminate its blood. This breed often weighs two hundred pounds, and may be considered the largest of the unimproved sheep ; of which weight the soft oily fat alone that forms the rump amounts to from twenty to forty pounds. In the neighborhood of Caucasus and Taurida, the hind quarters of the sheep are salted as hams, and sent in great quantities to the northern provinces of Turkey. In parts of Russia the fat-rumped

sheep bears a somewhat fine fleece, but generally speaking it is coarse, and is adapted only for the purposes of inferior manufactures.

FAT-TAILED SHEEP. This race of sheep is more extensively diffused than the fat-rumped, since it is found throughout Asia, a great part of Africa, as well as through the north eastern parts of Europe. Dr. Russell, in his history of Aleppo, gives the following account of it as it appears in Syria. The dead weight of one of these sheep will amount to fifty or sixty pounds; but some of the largest that have been fattened with care, weigh one hundred and fifty pounds, the tail alone composing one third of the whole weight. This broad, flattish tail is mostly covered with long wool, and, becoming very small at the extremity, turns up. It is entirely composed of a substance between marrow and fat, serving very often in the kitchen instead of butter, and cut into small pieces, makes an ingredient in various dishes.

FEATHERS. In Comparative Anatomy, constitute the peculiar covering of the class of birds. In no other tribe of animals are they met with; for the plumes which belong to some of the lepidopterous insects are different from the feathers of birds, both with respect to their structure and mode of growth. No bird is entirely deprived of feathers, although some species want them on certain parts of the body. The turkey and vulture have the head and part of the neck uncovered. The ostrich and the wading birds have bare thighs; those birds which have ceres, combs, or pieces of flesh on the head, have those parts without feathers.

FEELING. Is one of the five external senses, by which we obtain the ideas of solidity, hardness, softness, roughness, heat, cold, wetness, dryness, and other tangible qualities. Although this sense is perhaps the least refined, it is of all others the most sure, as well as the most universal. Man sees and hears with small portions of his body, but he feels with all. The author of nature has bestowed that general sensation wherever there are nerves, and they are everywhere found where there is life. If it were otherwise, the parts wanting this sense might be destroyed without our knowledge. On this account it seems wisely provided, that this sensation should not require particular organization. Feeling is, perhaps, the basis of all other sensations. The object of feeling is every body that has consistency or solidity enough to move the surface of our skin. To make feeling perfect, it was necessary that the nerves should form small eminences, because they are more easily moved by the impression of bodies than a uniform surface; and it is owing to this structure that we are enabled to distinguish not only the size and figure of the bodies, their hardness and softness, but also their heat and cold. To the blind, feeling is so useful a sensation, that it supplies the office of eyes, and in a great measure indemnifies them for the want of sight. We have known persons totally blind, whose sense of feeling was so acute that

they could, by the impression made on their feet, go from place to place with the precision of persons who can see, not only in their own houses and about their own premises, but for miles from home, finding any fixed object with unfailing certainty. True, such a discipline of feeling cannot be achieved without repeated and successive efforts. And we have known persons both blind and deaf with whom one might converse tolerably well by spelling the words to be used, and marking each letter with the finger, on the inside of their hands, they pronouncing the letters as soon as made, as though they had seen them.

FENCES. In this country, next to a good soil, good fences may be considered one of the most indispensable conditions of good farming. Without them the crop is never safe; cattle are sure to become unruly and troublesome; and neighbors, too, become vexed, and at last quarrelsome. In some countries, as in France, there are few or no enclosures. The inhabitants principally live in villages, and the animals of all kinds are kept under the charge of individuals who prevent them injuring the crops. In England stone walls and hedges are used for forming enclosures, and the last are so abundant as to form one of the most prominent and beautiful features in the landscape. In the United States, rail fence of some kind is principally used; the most common being the post and rail, or the Virginia worm fence. The hedge-fence is yet scarcely known among us, and the attempts that have been made to introduce it, either owing to unskilfulness, the selection of improper materials, or the peculiar nature and dryness of our climate in the summer months, have not been very successful. It is probable, however, that these difficulties will eventually be surmounted, and hedges become common. At present, where stone can be procured suitable for wall, fences partly or wholly of this material are the best that can be made. A stone wall of five feet is better security against unruly animals than a rail fence of seven; and though generally costing more at first, is not unfrequently the cheapest in the end. Where stone for a wall cannot be had, a good fence is made by laying a wall of three feet, placing a rail on the top of this, then staking it, and finishing with another rail.

FERMENTATION. An intense commotion, to which certain substances of vegetable or animal origin are, more or less, liable, from the spontaneous reaction of their constituent elements. The process embraces a series of changes of composition, and terminates in the formation of new products, which differ essentially from the original substance, as well as from one another. Fermentation is accordingly divided into three kinds; and to these, epithets have been applied descriptive of the products to which it gives birth, namely, the *saccharine*, the *vinous*, the *acetous*, and the *putrefactive*. The first of these produces sugar; the second, alcohol, the third, vinegar,

and the fourth, vegetable mould. It is with the last that the farmer is principally interested ; as on this process depends the advantages he derives from manures, from green crops used as dressings, and from the preparation of composts.

The vinous and acetous fermentation are confined to a very few substances, chiefly of a saccharine nature ; the putrefactive stage embraces a wider field, and takes place in almost every body of a vegetable or animal nature. The vegetable matters which undergo putrefaction most readily, are soluble in water ; though those which are but imperfectly soluble, if kept in a moist state, are not exempted from this species of decomposition. This process is promoted by the same circumstances which are favorable to the others, namely, moisture and elevation of temperature. The presence of air, also, has no less influence on the putrefactive, than on the acetous stage.

The elastic fluids which are evolved from vegetables during the putrefactive fermentation, are combinations of the elements of the vegetable substance, and have for their bases hydrogen and carbon. When the decomposition takes place under water, the hydrogen, by its greater tendency to elasticity, makes its escape, and the residual matter consists almost entirely of carbon. Hence wood which has been long buried in the beds of rivers, is reduced nearly to the state of charcoal. If the carbonaceous part, however, be exposed to the air, it undergoes a gradual change, and is at last entirely decomposed, by being converted into carbonic acid. When animal matters suffer putrefaction, they evolve, besides the usual elements of vegetables, a quantity of ammonia. They yield also certain other products which are more peculiar to them, particularly combinations of sulphur and phosphorus ; and to these substances must be ascribed fetid odor and noxious properties of the gases, which are extricated from them during putrefaction.

Animal bodies scarcely suffer any change when they are well dried, and completely excluded from the air. Even in the warmer climates, beef, which has been effectually freed from its juices, may be preserved a long time without salt ; and meat, which has been sufficiently roasted, and afterwards covered with melted suet, may be preserved in that state perfectly untainted for several months. Animals enveloped in ice, have been preserved for ages without suffering any change. It appears, also, that animal bodies powerfully resist putrefaction, which have been buried in morasses of peat ; probably because, in such places, the carbonaceous part of the woody matter being converted into a substance resembling tan, produces upon the animal matter the usual effects of that vegetable product.

FEVER. A disease characterized by an accelerated pulse, with increase of heat, impaired functions, diminished strength, and often with preternatural thirst. Fevers are often or generally preceded by chills or rigors, called the cold stage of the disease. Fevers are of

numberless fixed stars, of the nature, bulk, and properties of the sun ; but because they are at such immense distances from the earth, they appear to our eyes only as so many beautiful shining points. They are called fixed stars, because they do not change, like the planets, their relative position ; and they are distinguished from the planets by their twinkling light.

It is supposed that the fixed stars have primary and secondary planets revolving round them, as the planets of our system revolve round the sun. Were the sun as far from us as these stars are, it would doubtless appear as they now do. It is certain that they do not reflect the sun's light as do the planets ; for their distance is so great, that they would not, in that case, be visible. All the fixed stars, with the exception of the polar or north star, notwithstanding they do not change their relative position, appear to have a motion like the sun and moon, rising in the east, increasing in altitude until they approach the meridian, and declining to the western horizon, where they disappear. This apparent motion is caused by the revolution of the earth on its axis from west to east.

FLAIL. This is a wooden instrument for threshing corn. The construction of this implement is too well known to require description. The ancient Romans used a kind of whip-flail, to a limited extent, for the performance of this agricultural process ; but the prevailing mode, among the nations of antiquity, for separating grain from straw, was for cattle to tread it out in the open air. In modern times the flail is perhaps the universal implement used in this process, unless threshing is performed by machinery. All large farmers should have a threshing machine ; and even among small farmers there should be one in every neighborhood of a dozen families ; for the labor saved in a single season would be more than an equivalent for the cost of it. A good machine, to be operated by one horse only, with two men and a boy to tend it, will thresh from seventy-five to an hundred bushels in a day.

FLAME OF A CANDLE. Is a curious mechanical action and re-action of oxygen, hydrogen, and carbon. Whenever the light gas, called hydrogen, is excited, oxygen combines with it, and produces heat, and if carbon is combined with the evolving hydrogen, light is the result. A tallow candle, or the wick of a lamp, consists of hydrogen and carbon, and on being evolved by great motion, as by the touch of a match, or any other flame, the oxygen flows in and is fixed, and causes heat, and at the distance from the wick, where the efflux and influx cross each other, the film of the flame is created ; less carbon, makes blue light, a due proportion, white light, and an excess, the smoke of a candle, an excess of hydrogen, makes the blue light, and an excess of oxygen, red light. In truth, a candle is a prism, arising from the same principles differently exhibited.

FLANNEL. A kind of woollen stuff, composed of a woof and

a warp, and woven after the manner of baize. Various theories have been adopted to prove the utility of flannel as an article of dress. It is unquestionably a bad conductor of heat, and on that account very useful in cold weather; this is accounted for from the structure of the stuff; the fibres touch each other very slightly, so that the heat moves slowly through the interstices, which being already filled with air, give little assistance in carrying off the heat. On this subject Count Rumford has made many experiments, from which it should seem, that though a woolen substance is warmest in winter, it is also preferable, under certain circumstances, in summer. He expresses his surprise, that the custom of wearing flannel next the skin should not have prevailed more universally. He is confident it would prevent a number of diseases; and he thinks there is no greater luxury than the comfortable sensation which arises from wearing it, especially after one is a little accustomed to it. And he says it is a mistaken notion, that it is a too warm clothing for summer. He says, also, that he has worn it in the hottest climates, and at all seasons of the year; and never found the least inconvenience from it. This is his philosophy in the case. It is the warm bath of perspiration confined by a linen shirt, wet with sweat, which renders the summer heat of southern climates so insupportable; but flannel promotes perspiration, and favors its evaporation; and evaporation, as it is well known, produces positive cold.

FLAX. This plant has been cultivated from remote antiquity, throughout a great part of Europe, Asia, and the north of Africa, for various purposes. Its native country is not known with certainty, though, according to Olivier, it is found wild in Persia. It is cultivated principally for the fibre yielded by the bark, of which linen cloth is made. The use of this article is so ancient, that no tradition remains of its introduction. The ancient Scandinavians and other barbarous nations were clothed with linen. The mummies of Egypt are enveloped with it, and immense quantities are still made in that country, especially about the mouths of the Nile; and it is worn almost exclusively by the inhabitants.

The seeds of the flax are mucilaginous and emollient, and an infusion of them is often used as a drink in various inflammatory disorders; they also yield an oil, well known in commerce under the name of linseed oil, which differs, in some respects, from most expressed oils, as in congealing in water, and not forming a solid soap with fixed alkaline salts. This oil has no remarkable taste, is used for lamps, sometimes in cookery, and also forms the base of all the oily varnish made in imitation of China varnish. It is much employed in the coarser kinds of painting, especially in situations not much exposed to the weather. Equal parts of lime-water and linseed oil form one of the best applications for burns. The cakes remaining after the oil has been expressed, are used for fattening cattle and sheep.

Flaxseed has been substituted for grain in times of scarcity, but it is heavy and unwholesome.

FLEA. The history of those animals with which we are best acquainted is one of the first objects of our curiosity. If the flea be examined with a microscope, it will be observed to have a small head, large eyes, and a roundish body. It has two feelers, or horns, which are short, and composed of four joints; and between these lies its trunk, which it buries in the skin, and through which it sucks the blood in large quantities. The body appears to be all over curiously adorned with a suit of polished sable armor, neatly joined, and beset with multitudes of sharp pins, almost like the quills of a porcupine. It has six legs, the joints of which are so adapted, that it can, as it were, fold them up one within another; and when it leaps, they all spring out at once, whereby its whole strength is exerted, and the body raised above two hundred times its own diameter.

The young fleas are at first a sort of nits or eggs, which are round and smooth; and from these proceed white worms, of a shining pearl color; in a fortnight's time they come to a tolerable size, and are very lively and active; but if they are touched at this time, they roll themselves up in a ball; soon after this they begin to creep like silkworms that have no legs; and then they seek a place to lie hid in, where they spin a silken thread from their mouth, and with this they enclose themselves in a small round bag or case, as white within as writing paper, but dirty without; in this they continue a fortnight longer; after which they burst from their confinement perfectly formed, and armed with powers to disturb the peace of an emperor.

FLORIST. In Gardening, a name applied to such persons as are curious in, or have much skill in the knowledge and nature of flowers. A good florist should be perfectly acquainted with the names, characters, and kinds, or sorts of flowers; and at the same time have a thorough knowledge of their nature, habits, and methods of cultivation and management.

FLOUR. The meal of any grain but more particularly of wheat, ground and sifted for the purpose of food. The grain itself is not only subject to be eaten by insects in that state, but when ground into flour, it gives birth to another race of destroyers, who eat it unmercifully and increase so fast in it, that it is not long before they wholly destroy the substance. The finest flour is most liable to breed them, especially when stale or ill prepared; in this case, if it be examined in a good light, it will be perceived to be in a continual motion; and on a nicer inspection, there will be found in it a great number of little animals of the color of the flour, and very nimble. If a little of this flour be laid on the plate of a double microscope, the insects are very distinctly seen in great numbers, very brisk and lively, continually crawling over one another's backs and playing a thousand antic tricks

the surface. That portion of the water which soaks into the earth having passed through a sufficient thickness of porous strata, either by ascent or descent, will have all extraneous mixtures detained, and become clear spring water. It should be observed, that filtration can only produce transparency, by arresting such particles of matter as are in a state of mechanical mixture with the fluid, for any matter which is held in chemical solution in the fluid will pass with it, through the pores of the most minute filter, unless the substance of the filter itself should have a greater affinity for such matter than the fluid which contained it. In this case, a new combination will be formed, and the matter in solution, leaving the fluid, will be taken up by the filter, not simply because the passages are too small to permit its particles to pass, but on account of the superior elective attraction between the substance of the filter and the dissolved matter.

Filtration, on this principle, cannot continue to produce a natural spring for any great length of time ; because, by the constant addition of matter, the filter will at last become saturated with it, or choaked up. In applying this reasoning to springs, we shall find a reason why so few springs produce pure water, although it is always transparent. In reality, the great natural filters which produce springs, are almost always on an opposite principle, viz., that the substance which composes the filter has a great affinity for the water, and its particles are thereby taken slowly in solution, and carried off at the same time that the extraneous matters, which are only in mixture with the water, are detained in the pores of the filtering strata ; thus we find few springs which have not some mineral held in solution by the water, although invisible to the eye ; and in cases where heat is generated in making the new combination we have spoken of, hot springs will be produced. The most common mineral taint which water receives in its natural filtration, is sulphate of lime or plaster of Paris ; this renders the water hard, as it is called, so that it will not produce a lather with soap, but curdles it. Sulphate of iron or vitriol is also frequent in springs. Add to this, that in great towns, the drainage water which soaks into the earth is contaminated by animal matters as well as vegetable, and in such an offensive state, that the filtration through the soil can scarcely restore its purity.

Gravel, in thick beds, is the most perfect natural filter ; and instances may be met with, of springs from gravel producing water very nearly as pure as distilled water. Sand, when white, such as that of the seashore, is also very good ; but if colored, it generally contains iron ; and where the color is deep, the iron is often in such excess, that it will be communicated to the water in passing through it. Beds of sandstone filter extremely well, and also some porous limestone.

FIXED STARS. The universe, so far as human observation has extended, consists of infinite or boundless space, in which are

various kinds ; but the principal division of fevers is into remitting fevers, which subside or abate at intervals ; and continued or continual fevers, which neither remit nor intermit.

FIBRIN. A peculiar organic compound, found both in vegetables and animals. It is a soft solid, of a greasy appearance, insoluble in water, which softens in the air, becoming viscid, brown, and semi-transparent. On hot coals it melts, throws out greasy drops, crackles, and evolves the smoke and odor of roasting meat. It is procured, in its most characteristic state, from animal matter. It exists in chyle ; it enters into the composition of blood ; and it forms the chief part of muscular flesh ; and hence it must be regarded as the most abundant constituent of the soft solids of animals.

FILAMENTS. Vegetable filaments form a substance of great use in the arts and manufactures, furnishing thread, cloth, cordage, and the like. For these purposes the filamentous parts of hemp and flax are employed among us. Different vegetables have been employed in different countries for the same uses. In some parts of Sweden a strong cloth is said to have been prepared from the stalks of hops. These have been tried elsewhere, but without success. Vegetable filaments, and the thread or cloth prepared from them, differ remarkably from wool, hair, silk, and other animal productions, particularly in their disposition to imbibe coloring matters ; sundry liquors, which give a beautiful and durable dye to those of the animal, giving no stain at all to those of the vegetable kingdom.

FILTRATION. This is the act of clarifying impure water for domestic purposes. Filters for doing it are of various construction ; but they all act, somehow or other, as a sieve, or strainer, having innumerable small passages through which the fluid can percolate slowly ; but as the passages are not sufficiently large to allow the particles of matter which are mixed with the fluid to escape, they are detained by the instrument. In cities where the water of wells is usually impregnated with the various substances with which the entire earth is there saturated ; and, indeed, wherever the water furnished is impure, artificial filters are of great importance in domestic economy. Every family should be supplied with one. Rarely can spring water be found so free from extraneous mixtures, as that which has thus been artificially purified.

All springs of water which we are accustomed to call pure, are only rendered so by the effect of natural filtration ; for the rain falling upon the surface of the earth, soaks first into the vegetable mould with which the surface is almost everywhere covered ; in passing through this, it takes up not only dirt or earthy particles, but the remains of vegetable substances, which are in the progress toward decomposition ; the water is thus rendered turbid and unwholesome for domestic purposes ; such is the state of the waters of most rivers which are not supplied by springs alone, but by brooks running on

gether, whether for diversion or in search of food, it is not easy to be determined.

These animals are of an oblong slender form, their heads are furnished with a kind of trunk, or oblong hollow tube, by means of which they take in their food, and their body is composed of several rings. They do vast mischief among the magazines of flour, laid up for armies and other public uses ; when they have once taken possession of a parcel of this valuable commodity, it is impossible to drive them out, and they increase so fast, that the only method of preventing the total loss of the parcel, is to make it up into bread as soon as can be. The way to prevent their breeding in the flour is, to preserve it from damp ; nothing gets more injury by being put up damp than flour, and yet nothing is so often put up so. It should be always carefully and thoroughly dried before it is put up, and the barrels also dried into which it is to be put ; then if they are kept in a room tolerably warm and dry, they will preserve it well. Too dry a place never does any hurt, though one too moist always spoils it.

FLOWER. In physiological and systematical Botany, comprehends all those organs of a plant which are preparatory and necessary to the impregnation and perfection of the fruit or seed. Flowers are usually the most ornamental part of vegetables, but the most fleeting and transitory. After their production, the vegetation of the plant, however rapid and luxuriant before, is checked, at least for a time, even in perennial plants and trees ; and annual ones survive flowering only till they can ripen their seed. The same species which will endure for several winters without blossoming, after this event loses its vigor and yields to the first attacks of frost. Pliny observes that "blossoms are the joy of trees, in bearing which they assume a new aspect, vieing with each other in the luxuriance and variety of their colors." M. Dutens, a traveller in Holland, says, "I was witness to a circumstance I could not otherwise have believed, respecting the price of flowers in Holland. I saw 475 guineas offered and refused for a hyacinth. It was to be sure the most charming flower I had ever seen. It belonged to a florist, at Hague, and another florist offered this price for it."

FLUID. In physiology, an appellation given to all bodies whose particles easily yield to the least partial pressure, or force impressed. The nature of a fluid, as distinguished from that of a solid or hard body, consists in this, that its particles are so loosely connected together, that they readily move out of their places, when pressed with the least force one way more than another ; whence philosophers have concluded that these particles are exceedingly minute, smooth, and round ; it being otherwise impossible they should move with such freedom, upon the least inequality of pressure. Those particles, considered separately, are endowed with all the common properties of matter, and are subject to the same laws of motion and gravitation

with larger bodies. To inquire, therefore, into the nature of fluids, is to consider what appearances a collection of very small round bodies, subject to these laws, will exhibit under different circumstances.

FLYING. The progressive motion of a bird or other winged animal in the air. The parts of birds chiefly concerned in flying are the wings and the tail; by the former, the bird sustains and wafts himself along; and, by the latter, he is assisted in ascending and descending, to keep his body poised and upright, and to obviate the vibrations thereof. It is by the largeness and strength of the pectoral muscles that birds are so well disposed for quick, strong, and continual flying. These muscles, which in men are scarcely a seventieth part of the muscles of the body, in birds, exceed and outweigh all the other muscles taken together.

FOG, or MIST. A meteor consisting of gross vapors, floating near the surface of the earth. Mists, according to Lord Bacon, are imperfect condensations of the air, consisting of a large proportion of the air, and a small one of the aqueous vapor; and these happen in the winter, about the change of the weather, from frost to thaw, or from thaw to frost; but in the summer and the spring, from the expansion of the dew.

If the vapors, which are raised plentifully from the earth and waters, either by the solar or subterraneous heat, do, at their first entrance into the atmosphere, meet with cold enough to condense them to a considerable degree, their specific gravity is by that means increased; and so they will be stopped from ascending, and return back, either in form of dew, or drizzling rain, or remain suspended some time, in the form of fog. Vapors may be seen on the high grounds as well as the low, but more especially about marshy places. They are easily dissipated by the wind, as also by the heat of the sun. They continue longest in the lowest grounds, because these places contain most moisture, and are least exposed to the action of the wind.

Hence we may easily conceive, that fogs are only low clouds, or clouds in the lowest region of the air; as clouds are no other than fogs raised on high. When fogs stink, then the vapors are mixed with sulphureous exhalations, of which they smell. Objects viewed through fogs appear larger, and more remote, than through the common air. Boyle observes, that upon the coast of Coromandel, and the most maritime parts of the East Indies, there are, notwithstanding the heat of the climate, annual fogs so thick, as to occasion those of other nations who reside there, and even the more tender part of the natives, to keep their houses close shut up.

FOOD. Many persons are unaware of the great difference of nutritious matter contained in different articles of food in daily use. One might distend his stomach like a bladder, upon turnips, and yet

have very little to sustain life, or give him strength to labor. Potatoes contain much more nutriment than turnips, but nothing in proportion, according to bulk or cost, that is contained in many other substances used as human food. The following facts will show this difference. For instance, one thousand pounds of prime wheat contain 955 pounds of human food ; one thousand pounds of barley, 940 pounds ; one thousand pounds of rye, 792 pounds ; one thousand pounds of oats, 743 pounds ; one thousand pounds of beans, 570 pounds ; one thousand pounds of dry peas, 514 pounds ; one thousand pounds of potatoes, 230 pounds ; one thousand pounds of carrots and parsnips, 98 pounds ; one thousand pounds of cabbage, 73 pounds ; and one thousand pounds of turnips, only 50 or 60 pounds.

It may be seen from this that there is no economy in purchasing many of the coarse kinds of food in common use. Potatoes, at the prices they have ranged for several years, must be considered a luxury rather than a cheap diet ; for their cost is nearly the same per pound as wheat, and it takes more than four pounds of them to yield the nourishment in one pound of wheat. Indian corn is probably the cheapest food that can be had ; and it is far more economical to use beans, dry peas, beets, and parsnips, than potatoes. The following anecdote of a poor woman in Cincinnati shows a tact in economizing food rarely seen. She had seven children to be fed, and at one time she found herself wholly destitute of the means of providing for them, save eight laying hens. Here was an egg a day for each one ; but a pittance, all can see, wholly inadequate to fit the human frame for labor, and barely to sustain life. What could be done ? She exchanged each day six of her eggs for half a peck of beans, which, with a small piece of poor meat, procured with the other two eggs, was regularly made into a thick soup, and this enabled her to sustain her family till other means could be had. Such an example might be made worth thousands of dollars to the poor.

FOOD OF PLANTS. A plant or a tree can no more exist without food than can an animal ; and it is only because the mode in which they receive it is less evident to us, that we do not commonly think of vegetables as equally dependant with animals, upon the materials supplied to them by the elements around. We are constantly witnessing the act of feeding in all the animals that are under our notice ; but the growth and reproduction of plants seem to take place with so slight an introduction of solid matter into their system, that it cannot be comprehended, without further examination, how they derive the means of uprearing the gigantic masses of wood and foliage which many of them present to our admiring view. It is the business of the farmer to ascertain what kind of food is wanted for the growth of vegetation, and then to provide it. The absurdity of rearing or maintaining any animal without an adequate supply of the elements needed in animal substances, is too apparent to need illustra-

tion. Can an animal have bones, or blood, or muscles, unless supplied with food that contains the principles of these animal constituents? To suppose it, is contrary to common sense. The food of plants is furnished by the soil in which they grow, and the atmosphere. Hence, the soil must contain every portion of vegetable constituent not furnished by the air. If it does not contain it, plants will not flourish. They may have a feeble and sickly existence, but cannot flourish. In agricultural productions, if the soil does not contain it, the crops will be small, at best; perhaps not paying the labor of tillage. Let the farmer study this subject. To aid him we recommend to him a popular Treatise on Vegetable Physiology, published by Lea & Blanchard, or Johnston's Agricultural Chemistry.

FORCE, COMPARATIVE, OF MEN AND HORSES. There are several curious as well as useful observations in Desagulier's Experimental Philosophy, concerning the comparative forces of men and horses, and the best way of applying them. A horse draws with the greatest advantage when the line of direction is level with his breast; in such a situation, he is able to draw two hundred pounds eight hours a day, walking about two miles and a half an hour. And if the same horse is made to draw two hundred and forty pounds he can work but six hours a day, and cannot go quite so fast. On a carriage, indeed, where friction alone is to be overcome, a middling horse will draw one thousand pounds. But the best way to try a horse's force is by making him draw up out of a well, over a single pulley or roller; and in such a case, one horse with another will draw two hundred pounds. Five men are found to be equal in strength to one horse, and can, with as much ease, push round the horizontal beam of a mill, in a walk only nineteen feet wide; whereas, three men will do it in a walk forty feet wide.

The worst way of applying the force of a horse, is to make him carry or draw up hill; for if the hill be steep, three men will do more than a horse, each man climbing up faster with a burden of one hundred pounds weight, than a horse that is loaded with three hundred pounds, a difference which is owing to the position of the parts of the human body being better adapted to climb than those of a horse. On the other hand, the best way of applying the force of a horse, is in an horizontal direction, wherein a man can exert least force; thus a man, weighing one hundred and forty pounds, and drawing a boat along by means of a rope coming over his shoulders, cannot draw above twenty-seven pounds, or exert above one-seventh part of the force of a horse employed to the same purpose. The very best and most effectual posture in a man, is that of rowing; wherein he not only acts with more muscles at once for overcoming the resistance, than in any other position; but as he pulls backwards, the weight of his body assists by way of lever.

FOREST. In Geography. The Caledonian and Hercynian

forests are famous in history. The first was a celebrated retreat of the ancient Picts and Scots; the latter anciently occupied the greatest part of Europe; particularly Germany, Poland and Hungary. In Cæsar's time it extended from the borders of Alsatia and Switzerland to Transylvania, and was computed sixty days' journey long and nine broad: some parts or cantons thereof are still remaining. The ancients adored forests, and imagined a great part of their gods to reside therein; temples were frequently built in the thickest forests; the gloom and silence whereof naturally inspire sentiments of devotion, and turn men's thoughts within themselves. For similar reasons the Druids made forests the place of their residence, performed their sacrifices, instructed their youth and gave laws in them. The moral influence of forests to the contemplative mind, no one can deny, is of a high order; and, in our own country, as a matter of taste and prospective interest, there has been a recklessness in destroying them, that is incomprehensible.

It must be apparent to the slightest observer, that the forests of the country are rapidly diminishing, and that wood every year is scarcer and dearer. Considering the value and necessity of woodlands to future generations, a farmer cannot do better service to his posterity, and to the State, than to perpetuate the forests. To accomplish this object, the woods now standing must be carefully guarded and cut with caution. Only the oldest trees should be selected, leaving the others to improve by standing. The high price of wood leads our farmers, often to cut off all the timber of some pieces of land, whose soil, rocky situation, or position on a side hill, prove that it is of no service but for wood. A little care of such tracts, would lead to their perpetuity, and to their constant increase in value. All woodlands should be so securely fenced that cattle should have no access. A little care will protect the young trees from the growth of underbrush. But there is one thing, hitherto neglected by our farmers, to which we wish to call their attention, and that is the sowing of various nuts, that will preserve the forest to posterity. It is on this subject that the present generation have been the most careless, and have shown the least regard to the benefit of the future, because they may suppose the present will derive no advantage from it. Let therefore, our farmers, every year scatter acorns of different species, especially of the white oak, beach nuts, hickory nuts of the kinds most serviceable for fuel, and in places adapted to the tree, chestnuts, if they wish a supply of fencing, maple and ash keys, &c, and they will be doing as much service to their grand-children as if they laid up money for them at ten per cent. interest.

FOUNDER. This is a disease of the horse caused by riding or driving him until much heated and fatigued, and then allowing him to cool suddenly, by drinking of cold water, or standing in an exposed situation, or in a cold stable without covering; or, without sudden

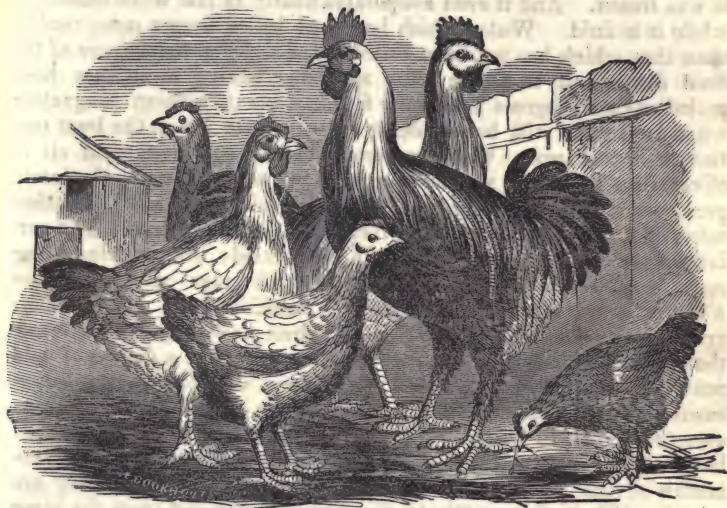
cooling, it may be produced by too bountiful feeding, and his swallowing his food greedily, while very warm and hungry. Under such unfavorable circumstances, the poor animal, after resting, instead of being refreshed, is stiff and sore; his rest, food, and drink, being more destructive to health than constant action and abstinence. On the contrary, had he been allowed to cool gradually, and fed sparingly, he would have escaped injury. The reader is referred for a cure of founder to Cole's Diseases of Animals, published by J. P. Jewett, and to Youatt on the Horse, published by Derby and Miller.

FORK. Forks are first mentioned in an inventory of a prince's plate, in 1379. Before this period, the knife only was used for the purpose of cutting up food. The use of the fork spread from Italy to the northern parts of Europe. Thomas Coryate is said to have introduced it into England. The use of the fork was considered so great a luxury, that many monastic orders forbade their members to indulge in it. The Asiatics, even to this day, use no forks, as is also the case with the Turks. The Chinese, instead of forks, make use of two small sticks, which they hold in the same hand between different fingers.

FOUNTAIN. A natural spring of water rising out of the ground; also a stream of water ejected through a pipe by means of a machine contrived for this purpose. Artificial fountains are various in their forms, but they all act on the principle of a pressure, either from a head of water, or arising from the spring and elasticity of the air. When fountains are formed by the pressure of a head of water, or any other fluid of the same kind, with the fountain or jet, then will this spout up nearly to the same height as that head, allowing a little for the resistance of the air, with that of the adjutage, &c., in the fluid rushing through; but when the fountain is produced by any other force than the pressure of a column of the same fluid as itself, it will rise nearly to the altitude of the fluid, whose pressure is equal to the given force that produces the fountain.

FOWLS. The culture of fowls, although very common among farmers, is by no means estimated according to its importance. Poultry are among the chief luxuries in culinary economy. Without their meat and eggs, what substitute could be furnished, not leaving a lamentable deficiency to the epicure, and even to those who eat mainly for the purpose of keeping soul and body together. In secluded situations, when no butcher's cart or shop is near, how convenient—nay how almost indispensable it is, if a friend from a distance unexpectedly make a call, or if there be indisposition in the family, and chicken broth is needed, that there be at hand a poultry establishment, to furnish materials for the occasion! What could be done without it? Nor is the profit of fowls, when kept for the market to be overlooked, or under-estimated. The profits of fifty hens, with proper care, besides paying for their feed, will not fall below fifty

dollars annually. What investment is better? Much is said about fancy breeds of poultry. The presumption, however, is, that hens which weigh eight pounds each will eat twice as much as those that weigh only four pounds. The best policy for those who keep fowls for profit, is to select such breeds as lay most eggs, furnishing also a fat tender carcase, according to the feed which they require. Those who desire to become amateurs in this branch of rural economy are referred to Browne's American Poultry Yard; Bennett's Poultry Book; and Dixon and Kerrs' Book on the same subject.



SHANGHAE FOWLS.

FOX. A common and mischievous animal, which, in all ages and nations, has been celebrated for his craft and wiles. He is so extremely fond of honey, that he attacks the nests of wild bees, regardless of their fury. They at first put him to flight by numberless stings; but he retires for the sole purpose of rolling himself upon the ground and crushing his enemies under him. He returns to the charge so often, that he obliges them to abandon the hive, which he soon uncovers, and devours both the honey and the wax. The fox sleeps in a round form, like the dog; but when he only reposes himself, he lies on his belly with his hind legs extended. It is in this situation, that he eyes the birds on the hedges and trees. The birds have such an antipathy against him, that they no sooner perceive him, than they send forth shrill cries to warn their neighbors of the enemy's approach. The jays and blackbirds in particular, follow the

fox from tree to tree, sometimes two or three hundred paces, often repeating the watch-cries.

FREEZING. In philosophy, the same with congelation. Freezing may be defined the fixing a fluid body into a solid mass, by the action of cold. Water and some other fluids suddenly dilate and expand in the act of freezing, so as to occupy a greater space in the solid than in the liquid state; in consequence of which ice is specifically lighter than water, and floats upon it. Water also loses of its weight by freezing, being found lighter after it is thawed than before it was frozen. And it even evaporates nearly as fast while frozen, as while it is fluid. Water which has been boiled freezes more readily than that which has not been boiled; and a slight disturbance of the fluid disposes it to freeze more speedily; having sometimes been cooled several degrees below the freezing point, without congealing when kept quite still, but suddenly freezing into ice on the least motion or disturbance. Water, covered over with a surface of oil of olives, does not freeze so readily as without it; and nut oil absolutely preserves it under a strong frost, when olive oil would not. Rectified spirit of wine, nut oil, and oil of turpentine, seldom freeze. The surface of water, in freezing, appears all wrinkled; the wrinkles being sometimes in parallel lines, and sometimes like rays, proceeding from a centre to the circumference. Fluids standing in a current of air grow much colder than before. Fahrenheit had long ago observed, that a pond, which stands quite calm, often acquires a degree of cold much beyond what is sufficient for freezing, and yet no congelation ensued; but if a slight breath of air happens in such a case to brush over the surface of the water, it freezes the whole in an instant. It has also been discovered, that all substances grow colder by the evaporation of the fluids which they contain, or with which they are mixed. If both these methods, therefore, be practised upon the same body at the same time, they will increase the cold to almost any degree of intenseness we please. Plants are frequently destroyed by frost, when overtaken by it while in the vigor of growth, as the expansion of the juices in that state bursts the tender vessels, and causes death. The freezing of wheat causes more loss to the farmer and the country than all other losses from frost combined. When a soil is tenacious, or contains a large proportion of clay, and by its position or want of drainage abounds in water, as such soils usually do, there is great danger that wheat sown on such lands will freeze out, or winter kill, as it is termed; and examination will show that there are very few farms or fields where wheat is sown, where more or less plants are not destroyed by this cause. The destruction is usually performed in the spring months, when the ground is bare, and freezes at night after thawing during the day. There are very few soils where this evil exists which may not be cured by draining and subsoil ploughing, and as it is one that oftentimes seriously lessens the

amount of crops, and the profits of the farmer, it deserves serious consideration.

FRICTION. Denotes the resistance a moving body meets with from the surface on which it moves. Friction arises from the roughness or asperity of the surface of the body moved on, and that of the body moving; for such surfaces consisting alternately of eminences and cavities, either the eminences of the one must be raised over those of the other, or they must be both broke and worn off; but neither can happen without motion, nor can motion be produced without a force impressed. Hence, the force applied to move the body is either wholly or partly spent, on this effect; and consequently there arises a resistance, or friction, which will be greater, other things being equal, as the eminences are the greater, and the substance the harder; and as the body, by continual friction, becomes more and more polished, the friction diminishes.

A very large part of the power requisite to move a threshing machine, a wagon, or a plough, is expended in overcoming the passive resistance of simple friction; and the greater in any case the space on which this acts, the greater will be the force required to overcome it. A wagon, the axles of which run on rollers, where the friction is reduced to its minimum, will move over a surface with much less force applied, than one where the whole surface of the axle comes in contact with the inner part of the hub, and the friction of course is at its maximum. The experiments of Mr. Pusey of the English Royal Agricultural Society, proved that in all soils the celebrated Scotch plough, and consequently all ploughs similarly constructed, which, from its structure of share and mould-board, exposes a great extent of surface to friction, was so much impeded from that cause, that a large part of the power of the team was expended in overcoming it; and that in tenacious soils at least one-half of the force exerted was required to overcome the effect of this cause. It is clear, then, that a light plough, with a part of the weight supported on a wheel or wheels, and with the least possible surface exposed to friction, will move the easiest for the team; and in all implements and machinery, the lessening of the friction is one of the most important things to be aimed at in their construction.

FROG. The external figure of the frog is too well known to require being particularly described; its active powers are astonishingly great, when compared with its unwieldy shape; it is the best swimmer of all four-footed animals; and Nature has finely adapted it for those ends; the arms being light and pliant, the legs long, and endowed with great muscular strength. A single female produces from six to eleven hundred eggs at a time; but this only happens once a year. The male is of a greyish brown color; but the skin of the female is of a yellow hue; these colors grow deeper every time they change them, which frequently happens every eighth day. The

frog generally lives out of the water ; but, when the cold nights set in, it returns to its native place, always making choice of those stagnant waters at the bottom of which it is most likely to remain concealed ; there it remains torpid during the winter season ; but it is roused into activity by the genial warmth of spring. The croaking of these animals has long been considered as the certain symptom of approaching rain ; for no weather-glass can describe a change of season with more accuracy than this vociferous and noisy tribe ; and we could hardly imagine, that a creature of that size could send forth sounds that would extend the distance of three miles.

FROST. In Physics, that state of the natural world, in which the atmosphere so absorbs the caloric from bodies on the surface of the globe, as to leave them, more or less, without fluidity or expansion. The power of cold on vegetables is well known ; and though the frosts of severe winters are, on the whole, more injurious to vegetation than those of the spring ; yet the latter are productive of more extensive damage, because their effects are evident almost every year. Frosts act most powerfully on ground newly cultivated, on account of the vapors continually ascending from such soils. Trees recently cut, also, suffer more than others from the spring frosts ; a circumstance which must be attributed to their shooting forth with greater luxuriance. Hence, likewise, light and sandy soils are thus more frequently damaged, than firm and tough land, though both may be equally dry.

Although it has been generally believed, that frost meliorates the soil, and especially clay-lands ; yet, as ice contains no nitrous particles, such improvements can only be of a transitory nature, by enlarging the bulk of some moist soils, and leaving them more porous for some time after the thaw ; but when the water has exhaled, the ground becomes as hard as before, being compressed by the incumbent weight of the air.

FRUITS. Are much used as an article of luxury ; and from the effects they are too frequently seen to produce, they would seem to be by no means of a salutary nature. Looseness, vomiting, indigestion, and even inflammation of the bowels, have been seen evidently to proceed from the use of various fruits. Yet it is pretty certain that the fault has lain not with the fruit, but with the consumer. When fruit is eaten in large quantity, and in an unripe state, when it is forced into the stomach, already loaded with a plentiful dinner of soup, meat, pudding, and all the items of a luxurious table, there is nothing wonderful in the subsequent intestine war. But when fruit is taken in moderation, of a proper quantity and at proper seasons, no bad effects are to be dreaded. Fruits are evidently useful, and they are kindly sent at the very season when the system, heated and excited by the warmth of summer, stands in need of something cooling and laxative to be taken with the food.

The fruits in most common use may be classed under the heads of stone-fruits, the apple kind, berries, (without affecting botanical accuracy in the use of this term,) and farinaceous fruits. The stone-fruits are those which are of most difficult digestion. Plums and cherries are particularly so. The ripe peach is both delicate in its flavor and easily digestible; the apricot is also very wholesome; but the nectarine is liable to disagree with some stomachs. The fruits of the apple kind are somewhat firm in their texture, and therefore rather indigestible, and liable to be detained in the stomach. Pears are rather more allowable, as their texture is softer. The white skin of the orange should be carefully rejected, but the inner pulp is grateful to all stomachs, whether in health or sickness. The fruits of the berry kind are the most wholesome of all. The strawberry or raspberry are particularly good; the grape is cooling and laxative, but the husks and seeds are to be rejected; the gooseberry is not so digestible, especially if the skin be swallowed. It is only the pulp of these fruits that is digested; the seeds always pass through the body undigested, unless they be chewed. Other berries are generally baked in pies, but the pastry should be sparingly used. The melon, a farinaceous fruit, is almost sure to disagree with weak stomachs; and when eaten after dinner, always requires abundance of salt, pepper, ginger, or other condiment to be eaten with it. Many fruits, otherwise unsafe, are much improved by cooking. Baked apples are an excellent article of food, and may even be of benefit to dyspeptic patients. Dried fruits are generally esteemed very safe, but they are apt to run into fermentation from the quantity of sugar which they contain.

FUEL. In our climate, fuel is one of the great essentials for human comfort and the cost of it is one of the principal items, especially with the poor, for which provision must be made. The vast amount of it used, and the constantly decreasing amount of wood, hitherto mainly consumed for fuel, renders the future supply of the article one of the most important topics of consideration for the philanthropist and social economist. Is it not apparent, that the time is rapidly approaching when, in many portions of our country where wood is now used for fuel, there will be such a deficiency of it, if used in any appreciable quantity by the poor, the burden of procuring it must be nearly insupportable? How can this be remedied? Or, how can the evil be diminished? It can in a measure be done by the following precautions. First; no one, however much wood he may have, should cut down a single tree, great or small, or even sprout, unless it be necessary. No prudent man should do it, any more than a prudent mariner would throw overboard a portion of the ship's provisions, when some unforeseen casualty may put the life of his crew in jeopardy for the want of them. Multitudes of our farmers have cut down scores of acres of wood and burnt it up, or suf-

ferred it to rot on the ground, to make a clearing as it is called, when they already had double the cleared land they can cultivate properly.

The second precaution recommended is that all use dry wood instead of green. It is a fact well known, that two cords of dry wood, on an average, in all domestic purposes, are better than three cords of green. What makes green heavier than dry wood? The water or sap in the former. There is nothing else to make it. Hence, if a cord of dry wood weighs a ton, and a cord of green wood weighs thirty hundred, there is in the latter ten hundred weight of water or sap to be evaporated during the process of its combustion. It passes off in the form of hot steam and vapor, carrying with it of course so much of the caloric or heat, which, had it been confined, as it might have been, in the uses of dry wood, would go to the promotion of its legitimate purpose. The effect is precisely the same that it would be, if in the combustion of ten pounds of dry wood in a stove or fireplace, there should be a continual filtration upon it of five pounds of water, which would render necessary a constant current of air to effect combustion, and this air on being heated, would pass off with the evaporated fluid through the stove pipe or chimney. What would be thought of the sanity or the common sense of the person who should do this? He would have as much title to sanity and common sense, as the person who habitually or unnecessarily uses green wood instead of dry.

The third precaution recommended is, to have stoves of the best devise for saving fuel, instead of using it in large and open fireplaces, where, as Count Rumford says, four fifths of the heat pass up the chimney without any good; and, also to construct houses in a manner best calculated to save fuel. A little additional expenditure in the construction of houses having reference to this subject, and in the use of first quality stoves, will save more than one-half the fuel otherwise required. Suppose in a family fifty dollars a year only is thus saved, which is a moderate calculation, the amount, it will be perceived, in forty years, a period families hope to continue, reaches two thousand dollars without any interest—more than the cost of ordinary dwelling houses in the country for that time. And, if the fifty dollars thus saved were at the end of each year to be put at six per cent. interest, and then the whole from year to year be compounded, the whole will amount in the forty years to about eight thousand dollars. No wonder that so many persons continue poor. No wonder that so many agriculturists complain no money can be made by farming. The fourth precaution recommended, to prevent future scarcity of fuel, is that all farmers on their waste lands turn their attention to the raising of wood. This to their grand-children would be better than money invested at ten per cent. interest.

FULLER'S EARTH. In Natural History, a soft, grayish, brown, dense, and heavy marl. When dry it is of a grayish, ash-colored brown, in all degrees from very pale to almost black; and

it has generally something of a greenish cast. It is very hard and firm, of a compact texture, of a rough, and somewhat dusty surface, that adheres slightly to the tongue. It is very soft to the touch, not staining the hands, nor breaking easily between the fingers.

FUR. In Commerce, this signifies the skins of wild beasts, dressed in alum with the hair on, and used as a part of dress by princes, magistrates, and others. It was not till the later ages that the furs of beasts became an article of luxury. The refined nations of antiquity never made use of them; those alone who were stigmatized as barbarian were clothed in the skins of animals. Strabo describes the Indians covered with the skins of lions, panthers, and bears; and Seneca the Scythians clothed with the skins of foxes and the smaller quadrupeds. Most parts of Europe were then in similar circumstances. Cæsar was, perhaps, as much amazed with the skin-dressed heroes of Britain, as the celebrated Cook was at those of his new discovered regions. What time has done to us, it may also effect for them; and, it is to be hoped, with much less bloodshed. Civilization may take place, and those spoils of animals, which are at present essential for their clothing, become merely objects of ornament and luxury. It does not appear that the Greeks or ancient Romans ever made use of furs. It originated in those regions where they most abounded, and where the severity of the climate required that species of clothing.

FURZE. This is a hardy, leguminous evergreen, growing abundantly on poor lands, and made use of for hedging and coarse fodder in Europe. It grows rapidly, so that it can be cut every four years for fuel, and is so far nutritious that horses are often maintained on furze only; but considering the abundance of excellent fodder plants we possess, the introduction of furze is scarcely worthy of thought. And, as a fencing material, it is objectionable, from the room it requires, but the prickles with which it is covered make it a sure defence.

FUSTIC. This is a dyewood, and contains a great quantity of coloring matter, forming the most durable of all the yellow dyes, which, however, is mostly used in compounding green and a variety of drab and olive colors, as, when employed alone, it is dull and deficient in clearness. It grows in the West Indies, Mexico, and Campeachy, and even west of the Mississippi, in the southern part of the United States. The wood is also highly prized by the Indians for making bows, and is by them called bow-wood. It being firm, solid, and elastic, is well adapted to that purpose. In latitudes most favorable to its growth it reaches the height of sixty feet or more, but in Louisiana only about half that height.

GABLE. The triangular end of a house, barn, church, store, stable, or any other building, from the cornice or beams to the top, is called the gable end. The common elevation of the apex or ridge of

a roof is one-half the width of the building. Where utility only is desired, this is a proper elevation. If it were less the roof would be more likely to leak, from the water falling on it not having a sufficient tendency to run from it; and there is rarely any motive for having it higher. However, in gothic architecture, particularly in cottages, the elevation is higher, making the upper angle quite sharp. This in cottages allows better chambers; and in churches a better opportunity for appropriate arches.

GALE. This is a current; a strong wind. In the language of seamen, the word gale, when unaccompanied by any qualifying term, as a gentle gale, a moderate gale, signifies a vehement wind, storm, or tempest. In a small breeze, it is estimated that wind progresses at the rate of four miles an hour; in a fresh gale, twenty-five or thirty miles an hour; and in a violent storm, fifty or sixty miles an hour.

GALLINACEOUS. The name of a species of birds of the pheasant kind, including the common cock and hen, the characters of which are these. The beak is short, strong, and a little crooked, proper for the picking up of corn, which is the food of the whole species; the body is large, thick and fleshy; the wings are short and hollowed, and not calculated for much flying; they all breed a numerous progeny; they build on the ground; the young are not fed by the parent, but immediately shift for themselves; and some have long spurs behind their legs.

GALLON. This is a well known measure of capacity for dry or liquid substances, but is usually appropriate to the latter. It contains four quarts, eight pints, and thirty two gills. A gallon, however, is not always the same in its dimensions. The gallon of wine contains two hundred and thirty-one cubic inches, or eight pounds of pure water avoirdupois; the gallon of beer or ale contains two hundred and eighty-one cubic inches, or ten pounds, three ounces and a quarter avoirdupois pure water; a gallon of corn or meal, or any dry substance, contains two hundred and seventy-one and a quarter cubic inches, or nine pounds and thirteen ounces of pure water.

GALLOP. The movement of a quadruped, particularly of a horse, by springs, reaches, or leaps, is called gallop. The animal lifts his forefeet nearly at the same time, and as these descend and are just ready to touch the ground, the hind feet are lifted at once. The greatest speed of a horse is when he gallops, although he may gallop slowly as a pleasure movement for the person on his saddle.

GALLOWAY CATTLE. No breed of cattle is more readily known from their distinctive attributes than the Galloways of Scotland. They are straight and broad in the back, and nearly level from the head to the rump, are round in the ribs, and also between the shoulders and the ribs, and the ribs and the loins, and broad in the loins, without any large projecting hook bones. In roundness of barrel and fulness of ribs they will compare with any breed, and also in

the proportion which the loins bear to the hook bones, or protuberances of the ribs. When viewed from above, the whole body appears beautifully rounded, like the longitudinal section of a roller. They are long in the quarters and ribs, and deep in the chest, but not broad in the twist. The prevailing fashionable color is black; a few are of a dark brindle brown, and still fewer speckled with white, and some of them are of dun or drab color. The galloway cows are not reputed to be great milkers; but although the quantity of the milk is not great, it is rich in quality, and yields a large proportion of butter. But when fattened they are highly valued for the shambles. Indeed, the heifers generally, unless the finest of them reserved for breeding, are payed in reference to being fattened for that purpose.



FAT GALLOWAY-COW.

GALLS. Is the name given to morbid excrescences growing on different plants, in consequence of the attacks chiefly of hymenopterous insects. The egg of the insect is deposited in a puncture made with a sharp sting; and when it is hatched, the maggot causes a great degree of luxuriance in this part of the plant, which appears in various excrescences. Galls are found in the two British species of oak. The astringent galls brought from the Levant, and used in dying and making ink, are also the produce of a particular species of oak. The best Aleppo galls have generally a bluish, and sometimes a grayish and blackish color, inclining to bluish. They are of a close, compact texture, are difficult to break, and are unequal and warty on

the surface. The small, white, and broken galls are by no means good. About two thousand cwt of galls are annually used in great Britain, the value of which, six pounds per cwt., is twelve thousand pounds.

GAME. All sorts of birds and beasts that are objects of the chase. The laws which in England particularly protect this sort of property, are known by the name of the Game Laws. By these laws certain qualifications of property are required, to give a person the privilege of being allowed to kill game; and penalties are imposed on all persons who kill game, either without such qualification or at improper seasons; likewise the sale of game is prohibited under every circumstance. Attempts have been repeatedly made in parliament to procure a repeal, either wholly or in part, of these laws, which are thought to be oppressive in their operation.

GANGRENE. An intense degree of inflammation, in which the part affected grows livid, soft, little sensible, and is frequently covered with vesicles containing ichorous matter. But, when the part becomes blackish, flaccid, easily lacerated, cold, insensible, and emits the smell of putrid flesh, so that the corruption quickly spreads, it is then called sphacelus.

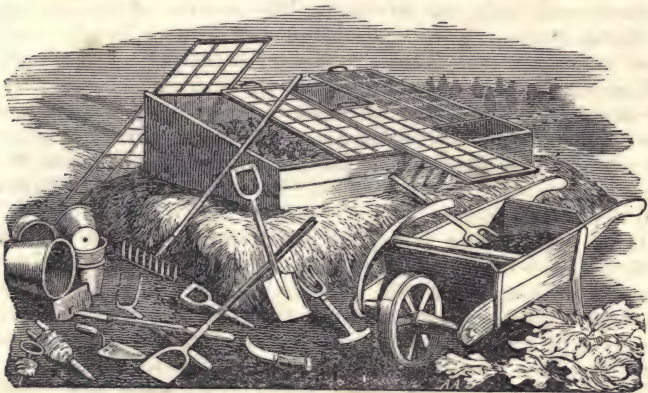
Persons of a good habit of body are seldom affected by a gangrene; though, even in them, it may accidentally be induced by contusion, long continued pressure, or by whatever destroys the texture of a part, and deprives it of its nourishment. Thus, in cold climates, severe frosts frequently occasion this malady, by impeding the circulation. In rheumatic constitutions, especially those advanced in years, the feet are first afflicted with pain; while on the inner side of the small toes, livid spots appear, from which the skin soon separates. By degrees, the foot swells, and the toes become mortified.

GALVANISM. Although this agent is generally believed to be identical with electricity, yet its mode of production, and the laws which it observes when in action, are so far peculiar, that it is frequently treated of by itself. Its name is derived from Galvani, an Italian philosopher, who, in the course of his experiments on animal irritability, observed the first striking phenomena which led to its discovery. So powerful is this agent, by the aid of a voltaic battery, on muscular action, that dead animals are again to appearance endowed with life. He accordingly called it animal electricity. The voltaic battery, or instrument used for experiments in galvanism, was constructed by Volta, and at first consisted of a pile or succession of plates of zinc and copper, each pair of which was connected by a piece of cloth moistened with water; but, from the inconvenience in using it, the voltaic battery is now made of such plates, vertically arranged in a trough crosswise, the ends of the plates firmly fixed in grooves of the sides of the trough, two plates by themselves, so that between each pair of these plates, there is a section of the trough to be filled with

water. To increase the effect, all that is needed is to increase the number of these plates, either in the same trough, or in a number of troughs, and all connected together, the whole constituting the battery. Sir H. Davy constructed a voltaic battery which contained two thousand of these double plates of zinc and copper, each plate six inches square, and twenty of them in a trough ; that is, one hundred troughs in all.

Galvanism produces an intense heat, sufficient to ignite and fuse the hardest metals, and even the most refractory earths. Galvanism is a most powerful agent in causing decomposition. By increasing the strength of the battery, substances held together by the most powerful affinity are easily separated. We have thus been enabled to ascertain the composition of some, till then reckoned simple ; and new bodies have also, by its aid, been discovered, which have themselves proved powerful means of analysis. About the beginning of this century, Sir Humphrey Davy subjected a number of substances to the action of a powerful battery, by which he discovered the compound nature of many ; and illustrated, by numerous instances, the chemical changes produced by this wonderful agent.

GARDENING. Gardening is the art of forming, planting, cultivating, and managing garden grounds, whether of the ornamental



GARDEN IMPLEMENTS.

or culinary kinds. In a more enlarged sense, it is the business of rendering the rural objects of nature more agreeable, interesting, and useful to mankind ; in the execution of which, the operator has the whole range of country scenery at his command, in order to select with taste such parts as are the most appropriate and suitable to his particular views and purposes.

Gardening is one of those arts that most obviously, from the ne-

cessities of mankind, have been practised at a very early period, so far at least as herbs and fruits are concerned. It seems not improbable but that it almost immediately succeeded the forming of distinct habitations, and the possession of individual property. It must, however, have remained long after its introduction in a very rude and imperfect state, as, notwithstanding the accounts that have been given of the magnificent gardens of early times, the Greeks and Romans seem to have been but little acquainted with them; for the garden of Alcinous, when divested of the beautiful language of the poet, appears to have been nothing but a sort of orchard and vineyard somewhat adorned with the prevailing works of art; or those of Lucullus, Cicero, and Pliny, among the Romans, anything more than mere places of retreat, planted with various odoriferous flowers and shrubs, and embellished with a variety of heavy and unnatural works of ornament.

GARLIC. This is a species of onion, cultivated in Europe since the year 1551. Garlic has a strong, penetrating odor, and pungent, acrid taste. It differs from the onion only by being more powerful in its effects. In warm climates, where garlic is produced with considerable less acrimony than in cold ones, it is much used, both as a seasoning and as a food. When bruised and applied to the skin, it causes inflammation and raises blisters. In the south of Europe, particularly in Spain, it is very much used, entering into the composition of almost every dish, not only among the common people, but among the higher classes of society; and it is everywhere prized by epicures. At all times, however, it has experienced much contrariety of opinion, and has been adored by some nations, and detested by others, as by the ancient Greeks. Its cultivation is easy, being a hardy plant, growing in almost every kind of soil; and it is reproduced by planting the radical or floral bulbs. In the Middle States, it acquires its full size about the latter end of August. Its medicinal virtues have also been much celebrated.

GAS. This name is applied by chemists to those fluids that partly resemble common air, yet differ from it in their qualities, and have never been made solid. There are a great variety of these; but those which, after oxygen, are of the greatest use, and in agriculture have the greatest effect, are those of carbon and ammonia. Carbonic gas is composed of carbon and oxygen. Ammonial gas is composed of hydrogen and nitrogen. Carbonic gas furnishes to plants the carbon which constitutes their stems or trunks, and is constantly absorbed and decomposed by the leaves of plants; the carbon is retained for the use of the plant, while the oxygen is thrown off to restore to the air that which was lost by the respiration of the millions of vitally organized beings that breathe on the surface of the earth. Ammonia is an alkali, volatile, and commonly known in some of its combinations as salts of ammonia, or when combined with a fluid, as spirits of hartshorn. This gas or its salts have a

highly exciting power on plants, and constitute one of the most essential ingredients in animal manures. When stable manures ferment too highly, this gas is volatilized and driven off, as the pungent odor arising from the manure proves, and is thus mainly lost to plants where the dung is applied. This may be remedied by making the compost heap of layers of manure, earth, swamp muck, or any substance that will absorb and retain the gases that may be developed during fermentation, as well as the fluids that drain from the manure while undergoing the process of conversion into compost.

GASTRIC JUICE. A fluid separated by the capillary exhaling arteries of the stomach, which open upon its internal tunic. The œsophages also afford a small quantity, especially in the inferior part. Modern philosophers have paid great attention to this fluid; and from their several experiments, it is known to possess the following properties. It is the principal agent of digestion, and changes the aliments into a kind of uniform, soft paste. It acts on the stomach, after the death of the animal. Its effects show that it is a solvent; but of that peculiar nature, that it dissolves animal and vegetable substances uniformly, and without exhibiting a stronger affinity for the one, than for the other. It is far from being of the nature of a ferment, as many suppose; for it is one of the most powerful antiseptics we are acquainted with; and from the experiments of Spallanzani, Scopoli, Carminati, and others, its nature appears to be essentially different in the several classes of animals, as they have proved by analysis. The gastric juice of the human subject, when healthy, is inodorous, of a saltish taste, and limpid, like water, unless it be a little tinged with the yellow color of some bile, that has regurgitated into the stomach. In quantity, it is very considerable, as must be evident from the extent of the surface of the stomach, and its continual secretion; but it is the most copious, when solicited by the stimulus of food. Besides the properties of this fluid before mentioned, it has others, which have induced physicians and surgeons to exhibit it medicinally. It cures dyspepsy and intermittent fever. Applied externally, in form of fomentation or poultice, it cures putrid and scrofulous ulcers in a wonderful manner; and it is to be regretted, that its utility is not more generally known.

GELATINE. This is one of the constituent parts of animal substances, and may be obtained by repeatedly washing the fresh skin of an animal in cold water, afterwards boiling it, and reducing it to a small quantity by slow evaporation, and allowing it to cool. It then assumes the form of jelly, and becomes hard and semi-transparent. It is a principal ingredient both of the solid and fluid parts of animals, and is employed in the state of glue, size, and isinglass. Gelatine is used in a new kind of bread, now manufactured in Paris. It having been found that the gelatine of bones used for soups was exceedingly nutritious, it was imagined that if this gelatine could be introduced

into bread from potato flour, which is very much less nutritious than wheaten flour, the former would be equally pleasant, and even more nutritive than wheaten bread. The experiment has been tried with great success; and beautiful loaves of bread, made in this way, are now sold in Paris at a much lower price than bread from wheat flour.

Gelatine is one of the most powerful and valuable manures, being supposed by Chaptal to act both as a stimulant and a nutritive substance. It is principally used in the shape of bone dust, though in many parts of the world it is used extensively in the form of flesh, as where fish are used for manuring. Bones are better than flesh, as they contain phosphate of lime, a substance that greatly aids the action of the gelatine. Bones contain about equal quantities of phosphate and gelatine. The bones, that are the hardest, have the least gelatine, and those of young animals more than those of older ones. Bones intended for grinding, should not be boiled, as they sometimes are in cities, to extract the fat and gelatine for soap, as it lessens their value for agricultural purposes. Bones should be ground fine, and if allowed to ferment so as to have the pungent ammoniacal odor appear, their action will be more prompt than otherwise.

GERMINATION. Among botanists, germination comprehends the precise time which the seeds take to rise, after they have been committed to the soil. The different species of seeds are longer or shorter, in rising, according to the degree of heat which is proper to each. Air and water are the agents of germinations. The humidity of the air alone makes several seeds to rise that are exposed to it. Seeds too are observed to rise in water, without the intervention of earth; but water without air is insufficient. Mr. Homberg's experiments on this head are decisive. He put several seeds under the exhausted receiver of an air-pump, with a view to establish something certain on the causes of germination. Some of them did not rise at all; and the greatest part of those which did, made very weak and feeble productions.

Thus it is for want of air, that seeds, which are buried at a very great depth in the earth, either thrive but indifferently or do not rise at all. They frequently preserve, however, their germinating virtue for many years within the bowels of the earth; and it is not unusual, upon a piece of ground being newly dug to a considerable depth, to observe it soon after covered with several plants, which had not been seen there in the memory of man. Were this frequently repeated, it would doubtless be the means of recovering certain species of plants which are regarded as lost; or which, perhaps, have never come to the knowledge of botanists.

GINGER. The root of a plant which grows spontaneously in the East and West Indies, and in China. It flowers about August or September, and fades about the end of the year. When the stalks are withered, the roots are dug up, commonly in January and Feb-

mary, and are picked, cleansed, and gradually scalded in boiling water. They are then dried by exposure to the sun, and form what is called black ginger. White ginger is the very same root, but in order to produce it, the roots are not scalded, but are picked, scraped, separately washed, and dried very carefully. Ginger is generally sold in knotty, branched, and flattish pieces, and is of a pale color and fibrous texture, when stripped of the outer bark. It should generally be chosen in large roots, new, and not easily broken; its color should be of a light brownish green, and it should be resinous within, and of a pungent aromatic taste. The dark, soft, and fibrous kind, should be rejected. Sometimes it is imported green from Bengal. Preserved ginger is brought from the West Indies and China, but the former is preferred. It is brought home in large and somewhat transparent pieces, of a bright yellow color. The jars which contain it should be carefully sealed up.

GLASS. Glass is the name of an artificial substance, formed by the igneous fusion of siliceous earth with various salts and metallic oxides, and possessing a high degree of transparency, equalled only by the more perfect crystals of the mineral kingdoms, and other physical properties, which render it one of the most useful and ornamental substances which the arts have received from the ingenuity of man.

GLAZING. In the manufacture of pottery, the incrustation of vessels with a vitreous substance, the basis of which is lead. The usual composition is, forty pounds of white sand, twenty pounds of red lead, and twelve pounds of pearl-ashes. After these ingredients are ground together, they are calcined with a moderate heat, and, when cold, reduced to powder. When wanted, the powder is tempered with water, and laid on the ware by means of a brush. Placed in a furnace, the violent heat soon transforms this coating into a perfect glass.

The glazing of all our earthen ware is very apt to crack, both from moisture and heat, being composed of lead, one of the most pernicious metals that could be devised for such important purpose. It is well known, that lead is easily volatilized by heat, and readily decomposed by any vegetable acid. Hence it has been affirmed by various eminent writers, that we are under the necessity of inhaling or swallowing, perhaps every day, a minute portion of a metal, which is one of the slowest, but most destructive poisons, and lays the foundation of many fatal disorders, such as palsy, dry colic, consumption, &c.; the remote cause of which has not, till lately, been suspected.

GLEANNING. Picking up the scattered ears of wheat after the wheat is cut and carried. It was once thought in England, that, by the common law, the poor might claim this liberty as their right; but it has been adjudged by a judgment of the Court of Common Pleas, that no such right exists by the common law of the land.

GLUE. Glue is a tenacious cement, principally used by cabinet-

makers, joiners, book-binders, case-makers, and hatters. The substances from which glue is made, are the shreds or parings of hides; the ears, before they are immersed in the tanner's vats; the cuttings and the raspings of horn, from the comb-maker, the button-maker, and the horn lantern-maker, and the hoofs and horns of oxen, calves, and sheep, from the butcher. These substances are indiscriminately mixed together, and are purified from all grease and dirt by digestion in lime water, the greatest care being taken to remove every piece that is in the slightest degree putrescent. The materials are next steeped and washed in clean water, with frequent stirring, and afterwards laid in heaps, and the water pressed out. They are then boiled in a large brass kettle, with clean water, the fat and dirt being constantly skimmed off as they rise, and when the whole is dissolved, a little melted alum, or finely-powdered lime is added. After the skimming has been continued for some time, the whole is strained through baskets and suffered to settle, in order that the remaining impurities may subside, and the fat rise to the top. The impurities and fat being removed, it is then returned into a clean kettle, and suffers a second evaporation and skimming. When it acquires a clean darkish color, and a sufficient consistence, which is known by the appearances during ebullition, it is lifted out by a scoop, into frames or moulds, about six feet long, one foot broad, and two deep, where it is allowed to cool gradually.

GLUTEN. When wheat flour or other farinaceous powders are put into a coarse bag and kneaded with water, that fluid carries off their starch suspended in it, and a tough substance is left in the bag which is called vegetable gluten. It is a soft viscid substance, tenacious, elastic, and very adhesive, having a fibrous texture, and a faint peculiar odor. When exposed to a dry air, it becomes hard and brittle, resembling a piece of glue. In a moist atmosphere, it swells, and undergoes putrefaction, emitting an offensive odor. Yeast or barm, which is employed to excite fermentation, particularly by bakers, is found to have many of the properties of gluten. Gluten is contained in greatest quantity in wheat; it is also found in other substances, though in small quantity, as in barley, rye, peas, beans, chestnuts, and many others. It does not, however, exist in potatoes. Gluten, from its close resemblance to the principles of the animal kingdom, is supposed to be very nutritious. From the changes which it so easily excites in other bodies, it is employed largely in distilling, and also in the making of bread.

GNAT. An insect fly that feasts on blood, and is the expertest phlebotomist in nature. The gnat is furnished with a proboscis, which is at once an awl proper for piercing the flesh of animals, and a pump by which it sucks out their blood. This proboscis contains, besides, a long saw, with which it opens the small blood vessels at the bottom of the wound which it has made. He is likewise provided

with a corselet of eyes studded round his little head, to see all the objects around him in every direction ; talons so sharp, that he can walk on polished glass, in a perpendicular line ; feet supplied with brushes to clean himself ; a plume of feathers on his forehead ; and an instrument answering the purpose of a trumpet, to proclaim his triumphs.

GOAT. The domestic goat is known in almost all parts of the world. If we may judge from the expressions of the ancient pastoral poets, goats were formerly attended in Greece and Italy with no less care than sheep. The milk is excellent, and has been thought peculiarly serviceable for consumptive persons. The Angora goat is furnished with soft silky hair, of a silver white color, hanging down in curling locks eight or nine inches long. From the wool or hair of this goat the finest camlets are made. The Cashmere goat, as its name indicates, is a native of the kingdom of Cashmere ; it is smaller than the domestic goat, and has long, silky, fine hair, not curled, as in the Angora goat. This variety has been successfully introduced into France, where it has bred with another variety equally valuable, the Thibet goat. From these animals are procured the materials for the manufacture of Cashmere shawls.

GOOSEBERRY. The gooseberry is well known as a most wholesome fruit, chiefly confined to cold or temperate climates. It appears to have taken the name of gooseberry from its being used as sauce for young or green geese. From a small berry in the wild state, the gooseberry, like the apple, has been multiplied in its variety, and brought to its present size and flavor by the industry of well-skilled gardeners ; and it is now deemed one of our most valuable fruits, being easily propagated, and regular in its production ; furnishing our tables with a wholesome and agreeable diet. The gooseberry is the earliest, as well as one of the best fruits for spring tarts.

GRAFTING. The operation of grafting consists in affixing one portion of a plant to another in such a manner as that a vital union takes place between them. It is one of the most important processes in horticulture, as affording the most eligible means of multiplying and perpetuating all our best varieties of fruit-trees, and many kinds of trees and shrubs not so conveniently propagated by other means. The season for performing this operation is, for all deciduous trees and shrubs, the spring, immediately before the movement of the sap. The spring is also the most favorable period for evergreens ; but the sap in this class of plants being more in motion during winter than that of deciduous plants, grafting, if thought necessary, might be performed at that season. From the ease with which grafting is performed, there can now be no excuse for poor fruit, as any farmer may practice it, and every year would be thus adding to the stock of valuable fruits. It is quickly done, and attended with no expense, if performed by himself.

GRAIN. This is a general name, and includes all those kinds of grass which bear straw, and which are cultivated on account of their seeds for the production of meal or flour. The word corn, or its equivalent in other languages, is frequently applied exclusively to that kind of grain which constitutes the chief nourishment of the country; thus, in a great part of Germany, it is rye; in France, it is wheat; and, in our own country, it is maize. The great secret of the preservation of grain consists in protecting it from the action of air and moisture, with a low temperature. Either too much air, or moisture, or heat, will be fatal to it. The Chinese preserve their grain in pits dug in rock, or firm dry soil, and to protect the grain from humidity, these pits are lined with straw. Grain well dried and put up in stacks at harvesting, or in rows, will keep much better than if thrashed and deposited in common granaries, the chaff of the ear serving to absorb the moisture which is most injurious to it.

GRANITE. A compound rock, consisting of quartz, felspar, and mica, each crystallized and cohering by mutual affinity, without any basis or cement. The felspar commonly predominates, and the mica is in smallest quantity. The colors of the felspar are white, red, gray, and green. The quartz is light gray, and the mica dark. The granular crystals vary exceedingly in size, in different granite rocks. Occasionally granite is stratified: but sometimes no stratification can be perceived. Large globular masses, called rolling stones, are frequently met with, composed each of concentric lamellar concretions. Schorl, garnet, and tinstone, are frequently present in granite. Tin and iron are the only metals abundantly found in this rock. It contains molybdena, silver, copper, lead, bismuth, arsenic, titanium, tungsten, and cobalt. It is, however, poorer in ores than many other rock formations.

GRAPE. The fruit of the vine, growing in clusters, from which wine is expressed. Grapes are found by a chemical analysis to contain supertartrate of potash, tartaric acid, citric and malic acids, abundance of sugar, a portion of mucilage jelly, some albumen, and also, as is said, some gluten. When it becomes generally known with what ease some kinds of grape can be cultivated, no farmer should be without it. The fruit is delicious and conducive to health. The vine is hardy and requires no great attention. If in locations near to large cities, or where there is a demand for the fruit, the culture of it meets with an ample remuneration; but if not, a very few vines about the house, which are ornamental as well as useful, would ordinarily in the season of the fruit keep a family abundantly supplied with it.

GRATE. A frame of iron bars, used for burning coal or fuel. Grates are commonly smaller than fireplaces intended for the consumption of wood, on account of the greater heat emitted by coal. Those used for burning anthracite should be made deeper and of a greater height than others, so as to present a comparatively small

surface to the air ; for, in very cold weather, the air conducts the heat from the surface faster than combustion renews it, so that, if the amount of surface exposed be large, the fire will go out. This kind of coal yields no visible smoke. The chimney, however, should be large enough to transmit smoke, otherwise some of the carbonic acid, which is formed during the combustion, will be sent into the room. This gas is the suffocating vapor of burning charcoal.

GRAVEL. Stones from the size of a pin's head to those of two or three pounds in weight, are termed gravel, and the greater or less quantity of them in the soil, as well as the kind of rock of which they are composed, has a great influence on the fertility and cultivation of land. If the gravel is coarse, and the particles slightly connected, the soil will be what is called hungry, as manures put upon it sink among the porous materials, and produce little or no effect on the crops. On the contrary, if the gravel is finer, or sufficiently filled with other earths and vegetable and animal matter, it constitutes one of the most valuable soils, and is particularly excellent for wheat and clover. Gravelly soils are apt to be too dry ; but unless very coarse, the incorporation of clay will have a beneficial effect, by rendering it more retentive of moisture, and consequently giving it more support to the crop. Under the influence of the doctrine promulgated by Tull, that the finer the particles of the soil the better it would be, some farmers sifted some of their soils, and carried off the gravel so collected ; but the effect was found to be most injurious, as the soils speedily became too compact for profitable vegetation ; the experiment was abandoned, and the pebbles returned to their original place.

GRAVITATION. The principle of gravity, of so much importance in the sciences of mechanics and astronomy, was first explained by Sir Isaac Newton. His attention was first directed to the subject by seeing an apple fall to the ground, and he began to consider what could be the cause. The same phenomenon everywhere presents itself. A stone dropped from the hand comes to the ground. A sand-bag let fall from a balloon does the same. The same cause acting in all these cases is called gravity ; and its influence is exerted over all bodies whatever upon our earth. Smoke and vapor indeed arise from the surface of the earth, but that is for the same reason that wood rises to the surface of water, or a balloon in the air. In a vacuum produced by the air-pump, smoke and vapor do not ascend. Specific gravity, is the relative gravity of any body or substance, considered with regard to some other body which is assumed as a standard of comparison, and this standard, by universal consent and practice, is rain-water, on account of its being less subject in variation in different circumstances of time and place, than any other body, whether solid or fluid. And, by a very fortunate coincidence, at least to English philosophers, it happens that a cubic foot of rain-water weighs one thousand ounces avoirdupois ; and, consequently, assuming this as the

specific gravity of rain-water, and comparing all other bodies with this, the same numbers that express the specific gravity of bodies, will at the same time denote the weight of a cubic foot of each in avoirdupois ounces, which is a great convenience in numerical computations.

GRAZIER. In Agriculture, a term commonly applied to such farmers as are engaged in the art and business of fattening various sorts of live stock on pasture and other grass lands. That this sort of business may be managed to the best possible advantage, the grazier should have a perfect knowledge of the nature, properties, and value of all sorts of cattle and sheep stock, as well as of the quality of the ground on which they are to be fed, and of the most proper methods of suiting them to each other. And he should also be well informed concerning the nature and states of markets in general. It is obvious that upon those being well understood and properly regarded, much of the success of this sort of farming business must depend, as thereby proper advantage may be taken, not only of fairs and markets, but a variety of other necessary circumstances.

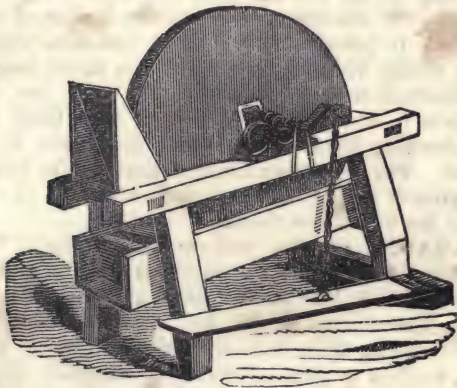
GREEN. One of the original colors excited by the rays of light. The green color of plants has been shown, by the French chemists, to depend upon the absorption of carbonic acid, and it is supposed that the leaves of plants have the power of decomposing the carbonic acid and water also.

GREEN TURTLE. The most noted and the most valuable of all animals of the tortoise kind; by reason of the delicacy of its flesh and its nutritive qualities, together with the property of being easily digested. This animal, which is found in great abundance on the coasts of Jamaica and some other West India Islands, is called the green turtle from the color of its skin, which is rather greener than that of others of the tortoise kind. It is generally found to weigh about two hundred; though some are five hundred, and others not above fifty. Dampier tells us, of one that was seen at Port Royal, in Jamaica, that was six feet across the back; and that the son of Captain Roach, a boy about ten years old, sailed in the shell, as in a boat, from the shore to his father's ship, which was about a quarter of a mile from land.

GRINDING. In Cutlery, the operation of sharpening edge-tools. This operation, as usually practised, is attended with no small inconvenience, from the production of heat by friction. The heat produced is so great, that hard tools are often softened and spoiled by the steel becoming ignited during the grinding. To prevent this effect, the grind-stone is partly immersed in a trough of water; but in this case the rotation of the stone must be moderate, and the work, of course, slow, else the water will be thrown off by the centrifugal force. When the water is applied from above by a cock, the quantity is too small to counteract the heat, and preserve the necessary low temperature. It has even been found, that the edge or point of a hard tool ground

under water will be softened, if it be not held so as to meet the stream, sparks being often produced even under water.

GRINDSTONE. This is a circular stone used for the grinding of edge tools, being mounted on a spindle, and turned by a winch-handle or crank ; but in manufacturing establishments, where much grinding is to be done, the stone is turned by water or steam. The stone suited to form grindstones, is what is denominated a sharp grit, that is, the grains of sand or silex of which it is composed are pretty uniform in size, and firmly attached to each other by a siliceous or other very hard cement, without the interstices between the grains being filled up, as frequently is the case, or nearly so, with the other kinds of sandstone. A grindstone mounted on friction rollers can be turned by a very small power applied, compared with what would be required were it not on them ; and if there be a treadle attached to the crank, in sharpening all small instruments the grinder can turn it by his own foot, so as to save the time of a second person.



GRINDSTONE.

GUANO. This is a manure used in modern husbandry ; less in this country than in England. It is merely the excrements of various sea-fowls, which resort in immense numbers to small uninhabited islands or rocky promontories on the coasts of Africa and South America, where they have remained in undisturbed possession for ages. Some of the deposits there made by these birds are from fifty to sixty feet in depth. Guano has been pronounced by competent judges to be the richest manure known to the farmer ; but, as might be supposed, it is of various qualities, depending not only on its original character, but the climate and meteorological influences upon it, where obtained. Its original character was the result of the peculiar food on which these birds feed, mostly flesh and fish, that afford a

stronger manure than that yielded by parrots or pigeons which live on berries and grain. Although the use of guano in this country is of recent origin, within the last ten years there have been imported of it about 650,000 tons.

GUINEA PIG. An animal of the hare kind, resembling a rabbit, but is less in size. It is a native of the warmer climates, but has long been rendered domestic over the world; in some places it is considered the principal favorite, and is often found even to displace the lap-dog. Its colors are different; some are white, some are red, and others both red and white. The male and the female are never seen both asleep at the same time; but while he enjoys his repose, she remains on the watch, silently continuing to guard him, and her head turned towards the place where he lies. When she supposes he has had his turn, she then wakes him with a kind of murmuring noise, goes to him, forces him from his bed, and lies down in his place. He then performs the same good turn for her, and continues watching till she also has done sleeping.

GUM. Is the mucilage of vegetables, and is of no particular smell or taste. It becomes viscous and tenacious when moistened with water; totally dissolves in water into a liquid, more or less glutinous in proportion to the quantity of the gum; not dissolving in vinous spirits or in oil; burning in the fire to a black coal, without melting or catching flame; suffering no dissipation in the heat of boiling water. The true gums are gum arabic, gum tragacanth, gum senega, the gum of cherry and plum trees, and such like. All others have more or less of resin in them.

GUM ARABIC. Is the produce of a species of *Mimosa*. Its chief use in medicine is from its glutinous quality, which serves to incassate and obtund their acrid humors, and thus is useful in coughs, alvine fluxes, hoarsenesses, gripes, &c. In a dysuria the true gum arabic is more cooling than the other simple gums. One ounce of gum arabic renders a pint of water considerably glutinous; four ounces give it a thick syrupy consistence; but for mucilage, one part gum to two parts water is required; and for some purposes an equal proportion will be necessary. Hasselquist relates an instance of the extraordinary nutritive virtues of this gum, which happened to an Abyssinian caravan, whose provisions were consumed, when they had still two months to travel. They were then obliged to search for something among their merchandize wherewith they might support nature; and found nothing more proper than gum arabic, of which they had carried a considerable quantity along with them. This served to support above one thousand persons for two months; and the caravan at last arrived at Cairo, without any great loss of people either by hunger or diseases.

GYPSUM. A substance well known to the ancients, and one that is very abundant in nature, and is now denominated, according

to the new chemical arrangement, the sulphate of lime. It forms immense strata, composing entire mountains; it is found in almost every soil; it is contained in the waters of the ocean, and in almost all river and spring water. In these its presence is the cause of the quality termed hardness, which may be known by the water being incapable of forming a solution of soap, the sulphuric acid seizing on the alkali of the soap, and the oil forming a compound with the lime. Sulphate of lime is insipid, white, and soft to the touch. Water will not hold a five hundredth part of it in solution. Exposed to heat it appears to effervesce, which phenomenon is caused by the expulsion of water. It becomes opaque, and falls into powder. This powder, when its water has been driven off by the application of a red heat, absorbs water rapidly, so that if it be formed into a paste with water, it dries in a few minutes. In this state it is called plaster of Paris, and is employed for forming casts, and for a variety of purposes in the art of statuary.

Gypsum, when used in agriculture as a manure, is ground fine in mills for the purpose; and then scattered by the hand at the rate of two or three bushels per acre, and its effects on grasses are frequently perceptible for three or four years. It is best strewn when the leaves are wet with a light rain or heavy dew, and after the leaves of the plants begin to cover the ground. Some have objected to the use of gypsum, or plaster, that it produced greater crops at first, but that it speedily exhausted the land, and impoverished it. Those who make this objection, probably, took everything from the land, and returned nothing to it, relying wholly on the plaster to keep up the fertility, a course manifestly erroneous. Clover should always accompany the use of plaster, and when this crop is fed off on the land, and made part of the course of rotation, no deterioration, but on the contrary, an increase of the grain crops has taken place. Considerable quantities of earthy materials are usually mixed with plaster, giving it a dark color, and on the proportion of these in the mass, much of the value is depending. Of course that which is white is best, as the dark shades are caused by some other substance, probably mere earth.

HABITATIONS OF ANIMALS. Many animals, besides those of the human species, have the faculty of constructing proper habitations for concealing themselves, for defending themselves against the attacks of their enemies, for sheltering and cherishing their young, and for protecting them from the injuries of the weather. All those of the same species, when not restrained by accidental causes, uniformly build in the same style, and use the same materials. From this general rule man is to be excepted. Possessed of superior faculties and understanding, he can build in any style, and employ such materials as his taste, his fancy, or the purposes for which the fabric is intended, shall direct him. A cottage and a palace are equally within the reach of his powers. In treating of this subject, we mean

not to trace the progress of human architecture, which, in the early stages of society, is extremely rude, but to confine ourselves to that of the inferior tribes of animated beings.

With regard to quadrupeds, many of them employ no kind of architecture, but live continually, and bring forth their young, in the open air. When not under the immediate protection of man, these species, in rough or stormy weather, shelter themselves among trees or bushes, retire under the coverture of projecting rocks, or the sides of hills opposite to those from which the wind proceeds. Besides these arts of defence, to which they are prompted by instinct and experience, nature furnishes them, during the winter months, with a double portion of long hair, which protects them from cold, and other assaults of the weather.

Of the quadrupeds that make or choose habitations for themselves, some dig holes in the earth, some take refuge in the cavities of decayed trees, and in the clefts of rocks, and some actually construct cabins, or houses. But the artifices they employ, the materials they use, and the situations they select, are so various and so numerous, it would be impracticable to enter into any minute specifications in this short article. It may, however, be remarked, that the architecture of several of these creatures denotes a degree of intelligence, or perhaps, instinct it should be called, that is wonderful; and the study of it would be amusing, to say the least. Take as samples, the labors of the Beavers and the Alpine Marmot, which indicate an adaptation to the object to be attained that is extraordinary in the extreme.

HAIL. In Natural History, a meteor, generally defined frozen rain, but differing from it in that the hailstones are not formed of single pieces of ice, but of many little spherules agglutinated together. Neither are the spherules all of the same consistence, some being hard and solid like perfect ice; others soft, and mostly like snow hardened by a severe frost. Sometimes the hailstone has a kind of core of this soft matter; but more frequently the core is solid and hard, while the outside is formed of a softer matter. Hailstones are of various figures; some round, others pyramidal, crenated, angular, thin, and flat, and some stellated, with six radii like the small crystals of snow. Natural historians record various instances of surprising showers of hail, in which the hailstones were of extraordinary magnitude. Mezeray, speaking of the war of Louis XII., in Italy, in 1510, relates, that there was for some time a horrible darkness, thicker than that of night; after which the clouds broke into thunder and lightning, and there fell a shower of hailstones, or rather (as he calls them) pebble stones, which destroyed all the fish, birds, and beasts, of the country.

Hail, so far as has been discovered, never produces any beneficial effect. Rain and dew invigorate and give life to the whole vegetable tribe; frost, by expanding the water contained in the earth, pulverises

and renders the soil fertile; snow covers and preserves the tender vegetables from being destroyed by too severe a frost. But hail does none of these. In winter it lies not sufficiently close to cover vegetables from the nipping frosts; and in spring and summer it not only has a chilling and blasting effect, but often does great damage to the more tender plants by the weight of the stones. In great hail storms the damage done in this manner is prodigious.

Hail is one of the natural phenomena for which it is difficult to account in any satisfactory manner. It is certain that, on the tops of mountains, hailstones, as well as drops of rain, are very small, and continually increase in bulk, till they reach the lower grounds. It would seem, therefore, that during their passage through the air they attract the congealed vapor, which increases them in size. But here we are at a loss how they come to be solid hard bodies, and not always soft, and composed of many small stars like snow. The flakes of snow, no doubt, increase in size as they descend, as well as the drops of rain or hailstones; but why should the one be in soft crystals, and the other in large hard lumps, seeing both are produced from congealed vapor?

Some modern philosophers ascribe the formation of hail to electricity. Signor Beccaria supposes hail to be formed in the higher regions of the air, where the cold is intense, and where the electric matter is very copious. In these circumstances, a great number of particles of water are brought near together, where they are frozen, and in their descent collect other particles, so that the density of the substance of the hailstone grows less and less from the centre; this being formed first in the higher regions, and the surface being collected in the lower, drops of rain and hail agree in this, that the more intense the electricity that forms them, the larger they are. Motion is known to promote freezing, and so the rapid motion of the electrified clouds may produce that effect. A more intense electricity also, he thinks, unites the particles of hail more closely than the more moderate electricity does those of snow. In like manner we see thunder clouds more dense than those that merely bring rain; and the drops of rain are longer in proportion, though they fall not from so great a height.

HAIR. This is a fine, threadlike, more or less elastic, substance, of various color, and constitutes the covering of the skin, particularly of the class of mammalia. The same variety and brilliancy are displayed in the feathers of birds, which may be considered as analagous to hair, of the most variegated and beautiful colors. In quadrupeds, it is of the most various conformation, from the finest wool to the quills of the porcupine, or the bristles of the hog. The hair, which is spread over almost the whole of the skin, is comparatively short and soft. On particular parts, a longer, thicker, and stronger kind is found; as, for instance, the mane and tail of the horse, the lion's mane, the covering of man's occiput his beard, and the beard of goats.

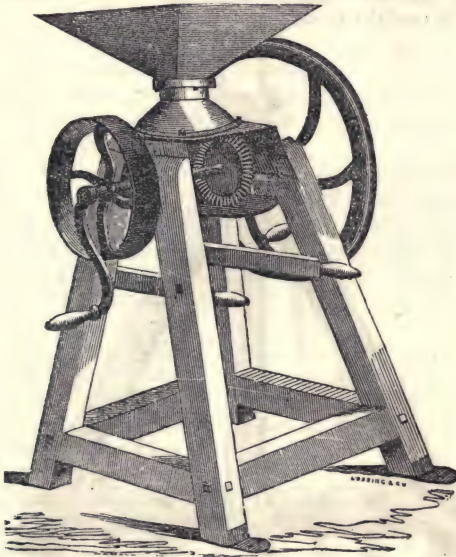
The color of the hair generally affords an external characteristic of the species or variety; but climate, food, and age produce great changes in it. The human body is naturally covered with long hair only in a few parts; yet the parts which we should generally describe as destitute of it, produce a fine, short, colorless, sometimes hardly perceptible hair. The only places entirely free from it are the palms of the hands and the soles of the feet. Hair not only serves as a cover or ornament to the body, but exercises an important influence on absorption and perspiration; where the hair is thick, the perspiration is freer. If the root is destroyed, there is no means of reproducing the hair; but if it falls out, without the root being destroyed, as is often the case after nervous fevers, the hair grows out again of itself.

HALO. A halo is a luminous circle, usually of various and beautiful hues, surrounding the sun or moon during certain conditions of the atmosphere. A halo of the moon is usually a white circle with an inner edge sometimes tinged with pale red. There is much truth in the remark, that a dense halo close to the moon portends rain. Lunar halos are most frequent, because the sun's rays are too dazzling to admit of their being seen. The most probable cause of this phenomena is, that it depends on the refraction of light in passing through small transparent prisms of ice, floating in the higher regions of the atmosphere.

HAMS. The ham is one of the most valuable parts of the hog, and which, if properly cured, may be preserved for almost any length of time, retaining its fine properties. The most esteemed, are made from hogs fed on solid feed, corn being the best, which are allowed considerable exercise; which do not weigh more than two hundred or two hundred and fifty pounds, and which have a large portion of muscular or lean flesh in their structure. The quality of the meat depends also on the manner of pickling and smoking it. Saltpetre in the curing of it gives it a good color, and prevents it from being too salt; the meat having a greater affinity for the former than for the latter of these substances. A little saleratus will render it tender, and sugar or molasses will give general improvement to the flavor. Our own rule is, to every hundred pounds of flesh, one pound of saltpetre, half a gallon of molasses, or its equivalent in sugar, and half a tea-cup of saleratus, made into a pickle, with salt sufficient to raise an egg half above the surface, the whole being simmered over the fire till all the impurities rise and are skimmed off. When cold, the hams are buried in it, and remain there from four to six weeks, when they may be taken out, dried, and put in the smoke-house. The smoke of cobs or hickory wood is best. They may be kept through the season hanging in the smoke-house, now and then making a little smoke under them; or, they may be sewed up in bags and white-washed, or they may be packed in ashes; either, if well done, will protect them from flies.

HAND. A member of the human body, at the extremity of the arm. The mechanism of the hand is excellently fitted for the various uses and occasions we have for it, and the great number of arts and manufactures in which it is to be employed. It consists of a complex of nerves, and little bones jointed into each other, which give it a great degree of strength, and at the same time an unusual flexibility, to enable it to handle adjacent bodies, lay hold of them, and grasp them, in order either to draw them towards us or thrust them off. Anaxagoras is said to have maintained, that man owes all his wisdom, knowledge, and superiority over other animals, to the use of his hands. The right hand was the place of honor and respect. Amongst the Greeks and Romans it was customary for inferiors to walk on the left hand of superiors, that the right hand might be ready to afford protection and defence to their left side, which, on account of the awkwardness of the left hand, was more exposed to danger.

HAND AND HORSE GRAIN MILL. In many localities, and particularly in seasons of drought, farmers are subjected to material inconvenience in having their grain ground. This usually happens

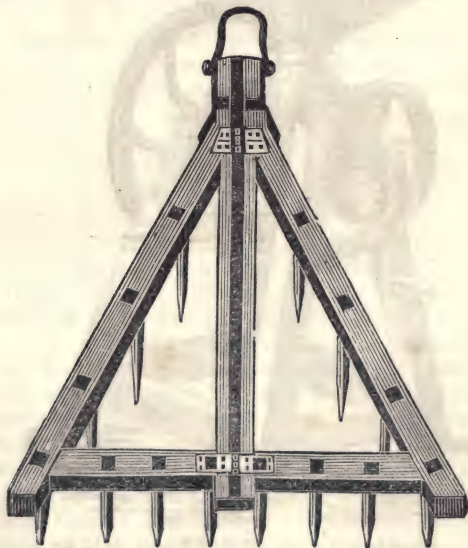


HAND AND HORSE GRAIN MILL.

when time can least be spared to go a long distance for it, in the season of hay-making and harvesting. To relieve them from this incon-

venience, small portable mills, operated by hand, or horse power, as occasion requires, have been provided. The accompanying cut represents one kind that has been highly commended. The grinding surfaces are made of iron, and when they are too much worn for use new ones can be substituted in their place. The mill is strong and durable. With horse-power applied, four bushels of fine meal can be made in an hour ; and a greater quantity of coarse. And, what is very important, the mill is not liable to get out of repair.

HARDENING OF TIMBER. The Venetians are famous for the soundness of their ships, which do not rot as those of other nations, but will endure much longer than the others. Tachenlus tells us, that the whole secret of this consists in the manner of their hardening their timber intended for this service ; and that this is done by sinking it in water while green, and leaving it there many years. This prevents the alkali, or that salt which furnishes the alkali in burning, from exhaling afterwards ; and by this means the timber becomes almost as incorruptible as stone. It is evident that the exhaling of this salt, and the rotting of wood, have some very great connection with one another, since the more sound any piece of timber is, the more salt it proportionably yields ; and the wood which is rotten is found on trial to contain no salt at all.



HARROW.

HARROW. Next to the plough, the harrow may be said to be the oldest agricultural implement. It is represented on the most

ancient sculptures of Egypt, and is known in some form wherever the earth is cultivated. Various forms are given to the harrow, from that of the wedge to the square, and the teeth are adapted to the work it has to perform. The great use of the harrow is in pulverizing the earth, tearing and freeing the soil from the roots of weeds and grasses, and covering seeds when sown. For this purpose, the harrow is preferred to the plough, as the latter usually places the small seeds at too great a depth for certain germination. Many of our best farmers, however, prefer the plough to the harrow for covering wheat; and as this grain, if sown in autumn, germinates better, and endures the winter better to have greater depth of earth than the harrow usually gives, they are probably correct in their preference. The Triangular Folding Harrow, represented in the preceding cut, is one of the best in use.

HARVEST. In Agriculture, a name which is commonly applied to the season in which grain, hay, and other crops are cut down, carried and secured in the barns or stack-yards. The particular period at which the harvest for corn and hay takes place, is sooner or later according to the nature and state of the climate, the qualities of the soil, and the peculiar circumstances of the crops in regard to situation and kind.

HARVEST MOON. An epithet applied to those moons which, in the autumnal months, rise on successive nights, soon after sunset, owing to the oblique ascension of the signs of the zodiac, through which the moon is then passing; which signs, in turning the globe, ascend almost horizontally.

HAULM. This is a name given to the stalks of beans and peas. When well harvested, these form a very hearty species of fodder. Both of these and all other kinds of straw haulm, should be given as fresh as possible from the flail, for they grow brittle, and lose a portion of whatever sap they possess, by exposure to the air; if kept long they grow musty also, and in that state are neither wholesome or readily eaten.

HAY. In most countries where the length and severity of the winters make some provision for domestic animals necessary, grass cut and cured in the form of hay, has always been the cheapest and most valuable. Grass for hay should be cut at the time when the nutritive parts are most developed, and that is in most cases when the plants are forming the seeds, but before they are ripened. In curing it, great care should be taken not to have it damaged by rain, nor should it be long exposed to the sun. In the first case the hay is washed and whitened, and in the last, the leaves crumble and fall off, thus materially lessening the quality of the article for fodder. Clover makes a hay which all animals eat greedily, but it requires more strict precaution in curing, and will bear less handling without injury, than any other of the grasses. The hay called rowen, or the second crop, is

very fine and good for lambs and calves, but has not the nourishment which the more natured plant possesses.

HEAD. In Anatomy. The head, besides possessing muscular parts and integuments in common with the rest of the body, is the seat of the organs of the external senses, and of the bony cavity in which the brain is placed. This variety of structures and of the functions which are performed by them, renders the head liable to many diseases, of which some affect the skin, muscles, and cellular texture, others the organs of sense, and others the brain and internal parts of the skull. The head is liable to all the varieties of external injury, of wounds of the scalp, and fractures of the skull; the organs of sense, to their peculiar maladies; and the brain and the internal parts to very many diseases. In an important work with which the profession has been favored by Dr. Abercrombie, he classes the diseases of the internal parts of the head under the inflammatory, the apoplectic, and the organic.

HEARING. The ear is the organ of hearing. In man it consists of an external ear, and an internal bony cavity with numerous circular and winding passages, by which the vibrations of the air are collected and concentrated, and by a peculiar mechanism conveyed to the auditory nerves. The ear is supplied with peculiar glands, which secrete an unctuous substance, called the wax of the ear. The internal auditory passage proceeds in a spiral direction to the tympanum or drum of the ear, which forms a complete partition between this passage and the internal cavities. Beyond the tympanum is a hemispherical cavity which leads to the fauces, or opening at the back of the mouth. This opening is of a trumpet form. The inner cavity, including the winding passage, is aptly called the labyrinth of the ear. The sense of hearing is, perhaps, still more important than that of seeing; but as we can have no just conception of the real state of social existence without either of these senses, it is idle to speculate on such comparisons.

HEAT. Heat is the well known sensation which we perceive on touching any substance whose temperature is superior to that of the human body. Chemists have agreed to call the matter of heat caloric, in order to distinguish it from the sensation which it produces. Caloric has a tendency to diffuse itself equally among substances that come in contact with it. If the hand be put upon a hot body, part of the caloric leaves the hot body, and enters the hand; this produces the sensation of heat. On the contrary, if the hand be put upon a cold body, part of the caloric contained in the hand, leaves the hand to unite with the cold body: this produces the sensation of cold. If you pour warm water into one basin, cold water into a second, and a mixture of hot and cold water into a third; then put one hand into the cold water, and the other into the warm, for two minutes, and after that put both hands into the luke-warm water, to the one hand it will

feel cold, and to the other hot. Persons ascending from the burning shores of Vera Cruz, on the road to the mountain land of Mexico, will feel the climate become colder, and will put on their great coats, and yet they will meet people descending complaining of the heat. Cold, therefore, is nothing but a negative quality, simply implying the absence of the usual quantity of caloric.

When gaseous substances become liquid, or liquid substances solid, by this change of state they lose, in a great measure, their capacity for caloric. During the slaking of quicklime, the caloric which is evolved escapes from the water in consequence of its changing from a liquid to a solid form by its union with the lime. When solid bodies become liquid or gaseous, their capacity for caloric is proportionably increased. If you place a glass of water in a mixture of equal quantities of snow and salt, during their conversion to a liquid, the water will be frozen in consequence of parting with its caloric to supply the increased capacity of the mixture. The portion of caloric necessary to raise a body to any given temperature is called its specific caloric. The instrument in common use for measuring the temperature of bodies, is called a thermometer. It consists of a glass tube containing a portion of mercury, with a graduated scale annexed to it.

When a thermometer is brought in contact with any substance, the mercury expands or contracts till it acquires the same temperature; and the height at which the mercury stands in the tube, indicates the exact temperature of the substance to which it has been applied. It will not show the absolute caloric in substances; for it cannot measure that portion which is latent, or chemically combined with any body. Caloric is the cause of fluidity in all substances capable of becoming fluid, from the heaviest metal to the lightest gas. It insinuates itself among their particles, and invariably separates them in some measure from each other. Thus ice is converted into water, and by a further portion of caloric, into steam. We have reason to believe that every solid substance on the face of the earth might be converted to a fluid, or even to a vapor or gas, were it submitted to the action of a very high temperature in peculiar circumstances. Some bodies give out their superabundant caloric much sooner than others. Iron is a quicker conductor of caloric than glass, and glass than wood.

The study of the laws of caloric to the agriculturist, is of great interest and importance. Although some plants can exist with a very small degree of heat, yet some of it is essential to all fluidity, as already stated, and also, of course, to circulation, and consequently without it there can be no growth. The rapidity of all vegetation is in a great measure depending on the degree of heat combined with moisture, to which the plant is subjected, and there are many which cannot exist except in countries and places of high temperature. The effect in forcing the growth of plants may be seen every season in our fields and gardens, and it has been ascertained by actual experiment, that

a difference of five degrees in temperature will advance or retard plants of the same kind and same advantages, temperature excepted, ten or fifteen days. Of all our cultivated plants, corn is the one which requires the highest temperature, and will endure it the longest without injury. Melons require more heat than the climate of the northern States afford to reach the perfection of which they are capable further south; and, in England, they cannot be grown at all, without the aid of artificial heat.

HEDGE. One of the most beautiful and durable of fences, made of living plants, usually those of a thorny nature, and disposed to grow in a close and impervious manner. One of the most striking features of the English landscape, is the hedges which serve to divide the estates from each other, or the several farms into suitable fields for the purpose of agriculture. In the United States, numerous attempts at making hedges have been made, but owing to some unexplained cause, with but little success on the whole. The plants used here have been generally the same variety of the foreign hedge thorn, but the deep green of the English hedge is not seen on the same plants here, and they are liable to the attacks of worms, which speedily destroy them. The Osage orange, the honey locust, the crab apple, and the wild mulberry, are natives of this country, and have been tried with different degrees of success. And there has been introduced for this purpose, into the vicinity of Boston, the buckthorn, and there are some beautiful specimens of hedges from this plant, which promise to be all the lovers of this kind of fence can desire. However, it is apprehended that as the circumstances here, are so different from what they are in England, it will be long indeed before hedges in this country become general.

HEMP. This is an annual plant of great use in the arts and manufactures, furnishing thread, cloth, and cordage. Hemp bears a near analogy to flax, not only in form, but also in culture and use. The bark of the stalk, as in flax, is the chief object for which it is cultivated. Large portions of the Western States are peculiarly adapted to the production of hemp, both so far as soil and climate are concerned; and for many years it has been a conspicuous object of attention. Kentucky may as yet be considered the great hemp growing portion of the American Union. It requires a warm, rich, vegetable mould, to produce it in perfection, and the best limestone lands in Kentucky and Tennessee are admirably adapted to it; and, it is to be hoped, that ere long enough of it will be raised to prevent the necessity of further importations of it from abroad.

HEN. The number of eggs laid in a year by the domestic hen are above two hundred; provided she be well fed and supplied with water. In the wild state the hen seldom lays more than fifteen eggs. When she begins to sit, her perseverance and patience are very remarkable; she continues for some days immovable; and when

hunger forces her away from the nest, she quickly returns. While she sits, she carefully turns her eggs, and even removes them to different situations, till at length, in about three weeks, the young brood give signs of bursting their confinement. When they have broken with their bills a passage for themselves through the shell, the hen continues to sit till they are excluded. When all are produced, the strongest taking the lead, and the weakest following, she leads them forth to provide for themselves, and in various ways seek the food that is necessary to supply their wants. She recalls them when they wander, spreads her wings over them to defend them against the inclemency of the weather, and broods a second time. In these expressions of anxiety and attention, her own health is visibly impaired, and she may be distinguished from every other hen by her ruffled feathers and trailing wings. The hoarseness of her voice, and its different inflections, are all expressive of her situation, and of her maternal affection and solicitude. For their preservation she neglects herself, and exposes her life to danger in their defence. Whatever the enemy be that assails them, she warns them by her repeated cries, and boldly attacks the foe, whilst her brood are driven into some place of security.



HEREFORD COW.

HEREFORD CATTLE. This is an English breed of the bovine family, deriving the distinctive name, from the county of Hereford, where it is common to the exclusion of most other breeds. They are usually of a dark red ; some of them are brown, and even yellow,

and a few are brindled ; but they are principally distinguished by their white faces, throats and bellies. In a few the white extends to the shoulders. The old Herefords were brown, or red-brown, with not a spot of white about them. It is only within the last fifty or sixty years that it has been the fashion to breed for white faces. Whatever may be thought of the change of color, the present breed is superior to the old one. The cows are not generally admitted to be equal in milking qualities to those of some other breeds ; but, they have their admirers in this country as well as in England. And if universally judged deficient in these qualities, the deficiency is balanced by the great weight to which they can be fattened. And the oxen are thought more profitable for the shambles than for the yoke, notwithstanding their great strength and docility.

HERON. This bird builds in cliffs over the sea ; though it sometimes will be found in numbers on high trees. The heron was formerly much esteemed as food ; it is remarkably long-lived, sometimes exceeding even sixty years. It is a great devourer of fish, and does more mischief to a pond than even an otter. It has been found that a heron will eat fifty moderate sized dace and roaches in a day ; and that in carp ponds, visited by this bird, one heron will eat up a thousand store carp in a year, and will hunt them so close as to let very few escape.

HICKORY. This name is applied to one of our well-known trees. The wood is coarse-grained, very heavy, exceedingly tough and strong, and red at the heart ; but it is not as durable as the wood of some other trees. It is employed for the shafts and springs of carriages, for large screws for presses, for bows, chair backs, whip handles, wooden cogged wheels, cask hoops, and a variety of other purposes. It is one of the most economical kinds of wood for fuel. The nuts of one species of this tree are much prized. They are commonly called shag-barks, from the roughness of the scaly surface of the bark of the tree on which they grow.

HIDE-BOUND. This is applied to a certain disease of cows and horses, in which the skin adheres to their sides. Want of proper care, spare diet, and bad food—sometimes long, rank grass, in swampy situations, and musty hay or oats, may be the causes of this affection. The skin of the hide-bound animal loses its pliability and flexible nature ; the surface of it is hard and dry ; the minute scales with which it is covered no longer yield to the hair, but separating themselves in every direction, they turn it in various ways, and so give to it that irregular and ragged appearance which is one of the characteristics of want of condition.

HIGH WATER. That state of the tides when they have flowed to the greatest height, in which state they remain nearly stationary for about fifteen or twenty minutes, when the water begins again to ebb. The time of high water is always nearly the same in the same

place at the full of the moon, and at all other times, the time of high water depends upon the age of the moon ; the rule for finding which, the age of the moon being given, is as follows, viz : add four-fifths of the days of the moon's age, as so many hours, to the time of high water at the full of the moon, and the sum is the time of high water, answering to that day nearly.

HOEING. In the new husbandry, is the breaking or dividing the soil by tillage while the corn or other plants are growing thereon. It differs from common tillage in the time of performing it ; and it is much more beneficial to the crops than any other tillage. This sort of tillage is performed various ways, and by means of different instruments. Next to ploughing, hoeing is one of the most effectual operations in farming ; and, especially in countries where Indian corn is grown, it may be considered indispensable. There are many kinds of the hoe adapted to its various uses in the garden or the field ; and in the form of it, and in the material used for its construction, depends its excellence. The blade or cutting part of a good hoe should be sufficiently hard to keep a good edge and not batter, and at the same time so elastic and fine tempered as not to be easily broken.

HOG. In grossness of manners, the hog tribe stand unrivalled among quadrupeds ; and their general appearance corresponds, in a great measure, with their habits. The natural term of the life of this animal is from fifteen to thirty years ; and it increases in size and strength until four or five years of age. In Minorca, it is said, that the hog is used as a beast of draught. The wild boar, from which most of our domesticated varieties are derived, is found in most parts of Europe and Asia, and is by no means so stupid or filthy an animal as the tame hog. Hunting the wild boar has always been a favorite amusement. When roused, he goes slowly and uniformly forward, frequently stopping and facing his pursuers, often inflicting severe and even mortal wounds. The common hog, in a tame state, is almost universal, except in very high latitudes. In the forests of South America, it is found in vast droves, derived from the European varieties again relapsed into a state of nature. The common hog appears to enjoy none of the senses in perfection except that of smell. In their taste they discover a strange degree of caprice ; for while they are singularly delicate in their choice of herbs, they will devour with voracity the most nauseous and putrid carrion.

HOLLYHOCK. A malvaceous plant, a native of the East, and very frequently cultivated in gardens for the sake of its ornamental spikes of large and beautiful flowers. The root is biennial, and shoots up one or several very upright, hairy stems, which attain the height of from five to eight feet. The leaves are cordate at base, and divided into from five to seven lobes. The flowers are subsessile, rose-colored, and situated in the axils of the superior leaves, thus forming a long terminal spike. From cultivation, many varieties have arisen, bear-

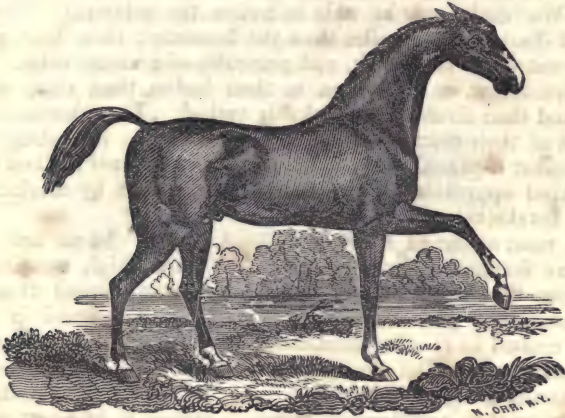
ing flowers, single or double, white, yellow, red, or even almost black. It is a hardy plant, and easily reproduced from seed.

HONEY BEES. A species of animals remarkable for industry, economy, and ingenuity. They have all things in common, and yet live under inviolable laws. Mindful of the coming winter, they toil in summer, and lay up food in common stock. Some are employed in the fields, gathering honey and wax; some construct the combs; some fill the cells with honey; some watch at the gates to observe the weather, or receive the loads of those that return to the hive. All have one time of labor; all have one rest from work. In the morning they rush out of the gates without delay; at evening all is hushed for the night. It has been remarked, that "if Newton had been a bee," he could not have constructed the combs or cells, with more geometrical exactness. In a hive of bees are commonly found from fifteen to eighteen thousand inhabitants; over which there is always a queen, that reigns absolute. The queen is distinguished from the other bees, by the form of her body; she is longer and larger than they are, and her wings are much shorter than theirs in proportion to her body. Her hinder parts are more taper than those of other bees; her belly and legs are of a deep golden yellow. A hive of bees cannot subsist without a queen, as she lays all the eggs, and thus produces the whole posterity. No other earthly monarch has such obedient subjects. If you take the queen, wherever you put her in sight, the whole hive will follow, and presently surround her; and when a queen happens to die, the bees of her hive immediately leave working, consume their honey, fly about their own and other hives at unusual hours when other bees are at rest, and pine away, if not soon supplied with another sovereign.

HONEYDEW. A term frequently applied to a clammy saccharine substance, which is often seen covering the leaves and other parts of different kinds of trees and plants, at some particular seasons of the year. It does not appear that the cause of this extraordinary appearance is yet fully understood, as it has not by any means been well ascertained whether it derives its origin from external circumstances, or some morbid affection of the vegetables themselves. It is generally, however, supposed to be the production of insects.

HOP. A plant with a creeping root, the stalks of which climb and twist about whatever is near them; wherefore, in hop grounds, poles are fixed near to the plant for them to rise upon. Hops are said to have been introduced into England from the Netherlands in the sixteenth century: they are principally used to boil up with beer, in order to prevent it from turning sour, and to give it a strengthening quality. Hops require to be planted in open situations, and in a rich strong ground. The two best sorts are the white and the gray kind. These should be planted in hills about eight or nine feet asunder. About the beginning of July hops begin to blow, and are ready to

gather about the latter end of August; when, by their strong scent, their hardness, and the brown color of the seed, they may be known to be fit. The best method of drying hops is on a kiln over a charcoal fire; when the stalks are brittle, and the top leaves easily fall off, they are promptly dried. When taken from the kiln, they should be laid to cool for three weeks or a month before they are bagged.



FLYING CHILDERS; AN ENGLISH RACE HORSE.

HORSE. The horse is known to most nations as the most useful and manageable of those animals that live under the sway of man. In gracefulness of form and dignity of carriage, he is superior to almost every other quadruped; he is lively and high spirited, yet gentle and tractable; keen and ardent in his exertions, yet firm and persevering. The horse is equally qualified for all the various purposes in which man has employed him; he works steadily and patiently in the loaded wagon or at the plough; becomes as much excited as his master in the race; and appears to rejoice in the chase. The horse feeds on grass and grain, and defends himself with his hoofs and teeth. His flesh, although rejected among civilized nations, is much used among several rude tribes; and from the milk of the mare, the Calmucks and other Tartars prepare a spirituous drink of considerable strength. The voice of this animal is peculiar, and well known under the name of neighing. The life of the horse, when not shortened by ill usage, extends from twenty-five to thirty years.

The horse, like the other tame animals, was no doubt originally wild, but his domestication happened at so early a period, as to leave no record of the event, and it is now impossible to ascertain, with any

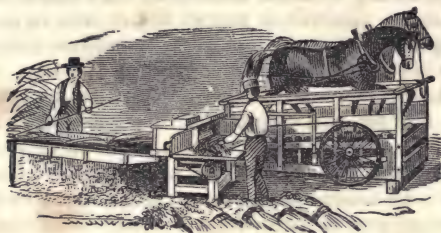
certainly, in what country he originated. Wild horses, it is true, are found in various parts of the world, but in most cases it is impossible to say whether they are the remains of the ancient stock or are derived from the domesticated animal; though, as respects those found in the American continent, there is no doubt but that they were originally introduced by the Spaniards. Desmarest gives upwards of twenty varieties of the horse, and his catalogue is by no means complete. We shall only be able to notice the principal. The wild horses of Tartary are smaller than the domestic; their hair, particularly in winter, is very thick, and generally of a mouse color. Their heads are larger, in proportion to their bodies, than those of tame horses, and their foreheads remarkably arched. These horses are very watchful of their common safety. Whilst a troop is feeding, one of their number is placed on some eminence as a sentinel; when danger of any kind approaches, he warns his companions by neighing, and they all betake themselves to flight.

The most esteemed horses are the Arabian. These are seldom more than fourteen to fourteen and a half hands high, more inclined to be lean than fat; they rise higher from the ground than other blood horses, and gather much more quickly. The breed in Arabia is never crossed as in other countries, but preserved unmixed with the utmost solicitude. The Arabs prefer the mare, as being more capable of bearing hunger, thirst and fatigue; and these must neither bite nor kick, or they are deemed vicious; indeed, it is no uncommon thing to see children play and fondle about the mare and her foal without fear of injury. Madden says, when an Arab sells his mare, he rarely sells all his property in her; he generally reserves the second or third foal. That author also observes, that it is so difficult to get a thorough-bred Arab mare to send out of the country, that he doubts if any ever go to Europe; those usually sent as such being Dongola horses, which are very inferior, being worth only from one hundred and twenty to one hundred and fifty dollars, whilst an Arabian is worth from fifteen to two thousand dollars.

The Persian horses are much esteemed, but not equal to the Arabian. The Barbary horse, which approaches the Arabian, is the origin of the Spanish and Italian. The Andalusian horse is much prized. It is small, but beautifully formed. The head is, however, rather large in proportion to the body, the mane thick, the ears long, the eyes animated, the breast full, the legs finely shaped, and the hoofs high. The Italian horses are not so much esteemed now as formerly; they are large, and move well, and are used for carriage horses and heavy cavalry. The Danish horses are stout and well built, but seldom elegant. The same may be said of the Dutch horse, which is preferred for draught throughout Europe. The French horses differ much, according to the part of the country from whence they are derived. The breed of horses in England and the United

States is as mixed as that of the inhabitants, the frequent introduction of foreign horses having produced an infinite variety.

HORSE-POWER. What is usually termed horse-power in rural economy, is the construction of machinery for the performance of labor, formerly done by man, and sometimes that done by water-power or steam. The more ordinary kinds of this labor are thrashing and winnowing grain; the sawing of wood, the grinding of grain; also the sowing or planting seeds, the reaping of grain, and the raking of hay. For the three first of these operations the same machine is used, having distinct fixtures for each one of them; and, for each of the three last there is a distinct machine complete by itself. It is



HORSE POWER.

reasonable to suppose, and it is proved by the fact, that horse-power thus applied is a great saving of manual labor, in some cases is of very great convenience, and on large farms is seemingly indispensable. In the first contrivances to effect these objects there have been defective results; but, wherever this has happened new efforts have been induced, so that at present, of the numerous machines devised, those that can be selected, apparently approximating perfection, that of Emery and Company, manufactured at Albany, is very highly recommended, and by many is esteemed superior to all others.

HORSE-CHESNUT. This is an ornamental tree; a native of the northern parts of Hindostan, and frequently cultivated in Europe and the United States. It was unknown to the ancients, and is now cultivated only for the sake of its beauty, the wood being of no value. It is one of our most admired ornamental trees. Its large and bright green foliage, its full rich form, and the profusion of spikes of flowers, of the most delicate and brilliant colors with which we are acquainted, render it one of the most showy trees to be found. In Europe, the fruit is used for feeding various kinds of cattle, who are said to be fond of it. For this purpose, it is first soaked in lime water, or an alkaline solution, which deprives it of its bitterness; it is then washed and boiled to a pulse. In Turkey it is ground and mixed with provender for horses.

HORTICULTURE. In its more limited application this is the culture of the kitchen garden and orchard. As such, the chief difference between horticulture and agriculture is, that in the former art the culture is performed by manual labor in a comparatively limited space, called a garden ; while in the other it is performed jointly by human and animal labor in fields, or in an extensive tract of ground called a farm. In its more extended and popular sense, horticulture not only means the cultivation of esculent vegetables and fruits, but the management of ornamental plants and the formation of rural scenery, for the purposes of utility and embellishment. It is difficult to imagine any occupation more conducive to the promotion of good taste and susceptibility to moral sentiment, than that of the well educated horticulturist. Nature is spread before him in full beauty ; it is from her teachings that he constantly receives instruction ; and thus, while he is storing his own mind with the idea of all that is beautiful and lovely, he has the every-day consciousness of laboring for the wants and for the pleasure of his fellow-creatures. Those who inculcate a taste for horticulture are public benefactors, and The Horticulturist of Downing should be in every farmer's family.

HOTBED. In Gardening, a name given to a sort of bed constructed for the purpose of producing artificial heat, and the raising of different sorts of culinary and other vegetables and plants. It is chiefly by the aid of these beds, also, that various tender plants, flowers, and fruits, are raised in perfection, which, without such artificial heat, could not possibly be produced or continued in this climate. By this means, likewise, vast numbers of seeds, which would otherwise remain years in the earth, and some never grow at all, are made to generate, form plants, continue their growth, and produce their flowers and fruits as in their native soils. And the cuttings and slips of many sorts of trees and shrubs, which would otherwise remain inactive and perish, are also made soon to emit root-fibres and shoots, and become plants in due time.

By this means, too, many valuable esculent plants, that succeed in the full ground at one time of the year or the other, are brought to perfection much sooner than they could otherwise be obtained, as the cucumber, asparagus, peas, beans, kidney-beans, radishes, carrots, strawberries, and various salad herbs, and other plants, which grow in the open ground of the garden departments. And annual flowering plants, as well as those of the herbaceous and shrubby kinds, are also brought to more early perfection and flowering by them. They are therefore of great use in the practice of gardening in numerous cases of forcing early productions.

HOUSES. Houses in our own country are of almost every possible imaginative device, from the cheapest log cabin to the most stately and enduring mansion. In the country, however, there has generally been manifested a lamentable want of taste and regard to comfort.

In the early settlement of the country, a necessity existed for the erection of some kind of a shelter, without regard to beauty or even for comfort, save to obtain protection from the inclemency of the weather. There was a general want of mechanical skill, of the requisite materials, and in most cases of the pecuniary ability, to pay regard to ornament, or the principles of architecture. This style of houses, or rather want of all style in them, originally the result of necessity, almost as a matter of course, with the masses of our yeomanry, has been perpetuated, in no small degree, after the necessity ceased to exist. Within the last few years there has been a praiseworthy manifestation of desire to correct the evil ; and we are now beginning, in transient localities, to observe the rising of the neat cottage, the commodious farm-house, and the expensive villa. This, as it becomes more general, will add much to the attractions and pleasure of rural life.

The English and Scotch cottages differ in their external appearance and management. The best English cottages of recent construction are built of brick and covered with slate. The use of these materials has changed the character of this class of dwellings. In many cottages the chimney stack forms the principal bearing of the floors and roof. The Scotch cottage has not only a different appearance when compared with the English, but, from its being so much wider, it admits of two apartments being formed on the ground floor. This is also a matter of necessity, as they are seldom raised more than one story. The material for the walls is most commonly stone ; the roof is large and heavy in appearance, and has but a small projection beyond the walls ; the gable walls also run up frequently above the roof, forming a parapet, which is sometimes notched so as to resemble steps, or has a battlement appearance.

As the French and Italians of the middle classes do not generally live in separate houses like the English, but on floors containing a series of rooms, it follows that the arrangement of their houses differs from that of the English. The staircase, as in public chambers, is common to each floor. The rooms communicate with each other, and generally with a passage or balcony on one side ; chimneys are rare, stoves being most commonly used to heat the rooms. French and Italian houses are mostly built of rough stone stuccoed ; the floors are seldom boarded, being paved with glazed tiles or unglazed bricks. The Spanish houses are very spacious ; they have large courts in the interior, and are formed with galleries round the inside of the quadrangular courts, families occupying the separate floors. The houses in many parts of Germany, approach nearer to the English in their arrangement, than the French and Italian houses. In many places the houses are a frame work of wood, and the interstices are filled with unbaked bricks, and are plastered with clay. The city architecture of Russian houses, both in its effect and arrangement, resembles

the architecture of the Italian and French houses, except that the roofs are covered with sheet iron painted with vivid colors, mostly red and green. The windows are double. The history of architecture is curious in the extreme, and would furnish amusement as well as useful instruction. It deserves more attention than it has received.

HUMMING-BIRD. The least of all the feathered tribes; its body being not bigger than the end of one's finger, and its eggs no larger than small peas: it is a native of America. On this little bird nature has profusely lavished her most splendid colors; the most perfect azure, the most beautiful gold color, the most dazzling red, are forever in contrast, and help to embellish the plumes of its majestic head. Like the bee, it finds its food in flowers and blossoms; when it feeds, it appears as if immovable, though continually on the wing. Myriads of these little birds are seen, feeding on the flowers and blossoms, in the southern parts of the United States, and in the Floridas.

HUMUS. The general name of humus is given to fine, dark-brown or blackish particles of decayed vegetation, which impart their richness to all fertile soils. It is frequently called vegetable mould. The amount of humus in the soil is readily increased by green fallows, by ploughing in straw, prepared peat, and all vegetable rubbish. The leaves of trees which fall in the forest in autumn, and the old roots of grass in the meadows, are likewise converted into humus.

HUNGER. The feeling of a want of food. When the stomach has digested and disposed of the food and drink which it contained, its peculiar nervous power is destroyed, and some time is necessary before it collects it again. This time is shorter in proportion as the individual is healthy, young, strong, and active. As soon as this nervous power is restored, the activity of the organ is again awakened, and produces a longing to eat, which we call, in its first degree, appetite. If this is not gratified, it gains strength, and becomes hunger, which, if not appeased, turns to voracity. Appetite is not a disagreeable feeling, but hunger is an ever-increasing pain, on account of the ever-increasing sensibility of the nerves of the stomach.

To some men, whose stomachs are morbidly sensitive, the first desire for food is unpleasant, and if this desire is not immediately gratified, they are seized with griping pains in the parts about the stomach, which, if not appeased, are followed by sudden weakness, and even fainting. If hunger is not allayed, a dreadful state of the body ensues, and finally death. After long continued hunger, the blood becomes weak, acrid, and thin, on account of the want of materials to compensate for the nutritious matter expended in the support of the body; hence the whole body becomes lean and weak, bloody fluxes take place from all parts, as well as violent irritation of the nervous system, caused by the excessive sensibility of the nerves of

The stomach, which at length extends to the whole region of the abdomen, is carried to a still greater height, and produces pain over the whole body, sleeplessness, convulsions, raving madness, until at length death puts an end to the scene.

HUSK. Among Botanists, the part which a flower grows out of. The husks or cups of the flowers of plants are not so much regarded with a view to their medicinal virtues as they deserve. Petiver, in the Philosophical Transactions, speaking of the virtues of the verticillate class of plants, among which are included the sage, rosemary, and the like, observes that it is an erroneous, though general opinion, that the flowers of these plants contain their principal virtues, for that the husks are the part in which it is lodged. For instance, in the rosemary, the fine scent of the Hungary-water is not in the flowers, but husks; and the flowers alone, when clean picked from them, yield very little odor. The cup, in this and other plants of the same class, is the only part in which their viscous and sulphureous qualities are lodged, and that something of this kind is deposited particularly there, may be perceived by the touch and smell; for they appear moist and feel clammy; and this clammy matter, when received upon the fingers, is of a very strong and agreeable smell, much more so than the rest of the plant.

HYACINTH. The numerous and splendid varieties of the garden hyacinth have always been general favorites, and, in some countries, the fondness for this plant amounts to a complete mania. In Holland, upwards of two thousand varieties have received distinct names, recognised by the different florists, and the price of one thousand florins has been paid for a single plant. The environs of some of the Dutch towns astonish the traveller, from the gorgeous appearance produced by the vast profusion of these flowers. The wild plant is a native of the Levant, and has a bulbous root, from which rise a few linear lanceolate leaves and a leafless stem, bearing six or eight bell-shaped flowers, of a blue or white color. The cultivated double varieties have very graceful forms and a remarkable diversity of color. The natural affinities of this plant place it in the same family with the squill and the onion. All the species of hyacinth are natives of the eastern continent.

HYBERNATION. Hybernation is that state of inaction and rest, which some animals and many plants undergo during the cold season of the year, and exhibits some remarkable phenomena, well deserving the attention of the naturalist. On the approach of winter, the badger, the marmot, ground squirrel, frog, toad, snakes, and some other animals, betake themselves to their retreats in the earth, where, in a torpid, motionless state, with but just circulation enough to preserve vitality, they remain until the returning summer rouses their drowsing faculties to action once more. Those instances in which animals and insects have been found in positions where they must

have remained for centuries, as frogs and toads in solid rocks, are examples of continued hybernation, produced by being placed in a position where the temperament and the confined state adopted at the commencement of the hybernation, is continued by causes afterwards superinduced. Thus the bats enclosed in the old mine, at Cheshire, (Conn.,) by a slide from the mountain, while in a state of hybernation, remained in that state for more than a quarter of a century, and were so found at the reopening of the mine. Thus toads hybernating in swamps, if covered, while in that state, to a depth which would prevent the usual effects arising from the changes of the seasons, would remain in that position, and the subsequent conversion of the covering matter into stone, would enclose them forever in the rocky mass. It is to this indurating process that we must ascribe the wonderful preservation and continued vitality of those reptiles which are found in the sand stones of the transition series.

The condition of plants, too, during our winters, in which the sap ceases to circulate, or circulates but to a limited extent, and in a languid manner, is a species of hybernation. It is a rest of the plant, a cessation of its functions, growth ceases, and what may be called a sleep of the plant ensues. Other causes may produce this rest of plants. Numerous instances have occurred in which a second blossoming has taken place, and the flowers of the first of October have vied with those of the first of May or June. This reviving of the plant has been noticed in the apple, plum, and pear. It is unquestionably to be attributed to the check which the extreme hot and dry weather gave to the trees, and which produced on them an effect similar to that of the hybernation of tropical plants. The functions of the plant were for a time partially suspended; heat had performed the effect of cold; the secretions of the plant, which prepare it for blooming and reproduction, had been performed, and when rains succeeded the drowth, their blossoming in October as well as in May, was the natural result.

HYBRIDS. When copulation takes place between different species of animals, the progeny which in some cases is the result, is termed a hybrid, as partaking of the qualities of both, yet distinct from either. Thus, a connection between the ass and the mare, produces the mule, and between the horse and the female ass, the hinny, the two most common hybrids among animals. The hybrids among animals do not have the power of reproduction, a proof that muling is a violation of nature's laws, by which the races as distinct species are governed. There has been in the highlands of Scotland a hybrid between the stag and the mare, the first ever known.

HYDROGEN. A constituent of water, and a rare gas, sixteen times lighter than atmospheric air, and on that account used to fill balloons. But its most important function is that of absorbing oxygen from surrounding parts, when excited by any accession of heat or undue

motion. Combined with carbon, it thus fixes or condenses the oxygen, forming aqueous vapor and smoke, thereby locating great heat, while the reaction of the excited parts causes a diffused action which is the important effect called light. With oxygen only it creates a yellowish light, but with a suitable proportion of carbon it makes all the colors of the prism, when the resulting light is mechanically decomposed by it. Of course, coals, bitumens, oils, tallow, spirits, and all bodies that burn, abound in it, for burning means nothing more than its power of absorbing oxygen when duly excited, and this absorption creates by reaction in the space, heat, flame, and light, universally. The carburetted vapor of hydrogen, evolved by subterranean heat from coal in the cavities of mines, is exploded by oxygen, with destructive effects when first excited by the similar process of a candle. When the same gas is made by distillation, and sent through pipes, it gradually explodes at the orifice, forming what are called gas lights. And when gradually evolved at the wick of a candle or lamp from the compound of carbon and hydrogen in the tallow and oil, the explosion accompanying the evolution of the gas creates our domestic lights. So also with the flame of a coal fire.

IBEX. This animal is distinguished by large knotted horns, reclining backwards, a small head, large eyes, a thick, short, strong body, short legs, very short hoofs, and a short tail. Its body is of a deep brown color, with a mixture of hoary hairs; its belly is of a tawny white; its legs partly black, partly white; the space under the tail, in some individuals, is tawny, in others white. The hair is harsh, and the male is furnished with a beard. These animals are seldom found, except in the most precipitous and inaccessible heights of lofty mountains, where they assemble in flocks, sometimes consisting of ten or fifteen individuals.

During the night, they feed in the highest woods, but, at sunrise, they again ascend the mountains, till they have reached the most perilous heights. They are remarkably swift, and display amazing agility and dexterity in leaping. They are objects of the chase, but, from the inaccessible nature of the places to which they generally resort, their dexterity in leaping, and the danger attendant on a pursuit of them, the ibex hunter must have a head that can bear to look down from the most tremendous precipices without terror, address and sure-footedness in the most difficult passes, and also much strength, vigor, and activity.

Another danger attendant on this chase is, that the ibex, when close pressed, will sometimes turn on his pursuer, and tumble him down the precipices, unless he has time to lie down, and permit the animal to pass over him. The ibex will mount an almost perpendicular rock of fifteen feet, at three successive bounds, appearing merely to touch it, to be repelled, like an elastic substance striking against a hard body. The fore legs being considerable shorter than the hinder,

enables these animals to ascend with more facility than to descend, and hence, when pursued, they always attempt to gain the summits of the mountains. They inhabit the chain of mountains extending from Mount Taurus, between Eastern Tartary and Siberia. In Europe, they are found on the Carpathian and Pyrenean chains, and in the Grisons and other parts of the Alps.

ICE. A brittle transparent body, formed of some fluid, frozen or fixed by cold. The specific gravity of ice to water is as eight to nine; or the specific gravity of water being one, that of ice is ninety-three; hence, being lighter than water, it floats upon it. The specific gravity of ice was tried by Dr. Irving, in Phipps' voyage to the north pole; who found that when a piece of the most dense ice which he could meet with was immersed in snow-water, the thermometer thirty-four degrees, fourteen-fifteenth parts sunk under the surface of the water; in brandy just proof, it barely floated; in rectified spirits of wine, it fell to the bottom at once, and dissolved immediately. This rarefaction of ice has been supposed to be owing to the air bubbles produced in ice while freezing; these, being considerably large in proportion to the water frozen, render the ice so much specifically lighter.

Accordingly, it is said that a considerable quantity of air is lodged in the interstices of water, though it has not there any elastic property, on account of the disunion of its particles; but these particles coming closer together, and uniting as the water freezes, light, expansive, and elastic air bubbles are thus generated, and increase in bulk as the cold grows stronger; whence of course the ice grows lighter, and these air bubbles acquiring an elastic force, burst to pieces any vessel in which the water is closely contained. But snow-water, or any water being boiled over the fire, affords an ice more solid than ordinary, and with fewer bubbles. Pure water, long kept in vacuo, and frozen afterwards there, freezes much sooner, on being exposed to the same degree of cold, than water unpurged of its air and set in the open atmosphere. And the ice made of water thus divested of its air, will expand in freezing; though it is much harder, more solid and transparent, and more ponderous, than common ice.

ICE-HOUSE. An ice-house may be simply a large cellar with hollow walls, containing fixed air; or, which is better, with walls filled in with sawdust or tanning, which is a non-conductor of heat, and furnished with roof and door, made in the same manner, and also with a drain to allow the escape of water produced by a partial thaw. The drain is as important as the non-conducting walls and roof; for standing water, on the floor or bottom of the vault containing the ice, is as prejudicial to the preservation of the article as heat itself. Latterly it has been judged preferable to erect an ice-house above ground, to having it under ground, or in a cellar. In both cases, the construction is similar; the walls, roof, and door being double, say with an intervening space of twelve inches, well filled and

rammed solid, of the sawdust or tannin. The west side of a hill, or under trees of dense foliage, is a desirable location for an icehouse; and it might be well that it should be covered over with ivy or grape vines, or honey suckle, to intercept the rays of the sun or the warm atmosphere. It is advisable also that the door should be on the west side, and that it should be opened during the night or in the morning when there is no current of hot air to rush in. By a small expense, every farmer may have a small ice-house, that in the hottest weather of summer will keep fresh meat in good order for any reasonable length of time, and where butter may be kept hard, adding at least ten per cent. to its value, whether designed for market or family use. Such saving from an ice-house would soon balance the cost of its erection.

ICE TRADE. A very curious traffic within a few years has sprung up; to wit, the transportation of ice from New England to tropical regions in different parts of the world. In the East Indies the artificial formation of ice has been long carried on, as the only means of cooling beverages and food. The ground near Hoogley, about forty miles from Calcutta, is formed into shallow troughs; into these troughs, on a layer of straw, are placed pans of porous earthenware. Shortly before midnight in the winter months, and when the wind happens to be blowing from the north-west, a little water is poured into each vessel or pan; and if all the circumstances are favorable, a film of ice is found in each pan on the following morning; and this ice is collected and stored with the utmost care. The selling price of this ice at Calcutta is about six pence per pound; but the Calcutta inhabitants were surprised by the arrival, in 1833, of a ship from the United States, laden entirely with ice, which was offered for sale at three pence per pound, which afforded the shipper a good profit. Since that time the price has been reduced; and the traffic has become regular, and of very considerable magnitude. It is mostly procured in the vicinity of Boston, where the article is very pure and solid, and can be obtained in any quantity desired. The contrivances for collecting, handling, and preserving it are exceedingly curious, and give evidence of American ingenuity and enterprise.

ICHNEUMON. An animal of the weasel kind, bred chiefly in Egypt. It has the strength of a cat, and is more nimble and more cunning; it easily strangles a cat that is larger than itself. It takes to the water when in danger, and will live a considerable time under water. More expert than cats in catching rats and mice, they are used in Egypt for that purpose. The animal makes war with great courage and eagerness upon all kinds of serpents. If bitten by the viper or the asp, it uses a certain root that cures the poison. Its principal service to the ancient Egyptians was in discovering and destroying the eggs of crocodiles; and for its usefulness in this respect it was worshipped by that idolatrous people as a deity.

ICELAND SHEEP. The sheep of Iceland are of two kinds ; the first, termed the native breed, is small, in color from dun to almost black ; the second is larger, the fleece white, and supposed to have originated from more southern regions. The fleece of these breeds consists of hair externally, with a white, close layer of wool



ICELAND SHEEP.

within, impervious to cold and wet ; it is worthless for manufacturing, and is used for horse collars, and more or less exported and appropriated to this purpose. The principal peculiarity about the native sheep is the number of their horns, many individuals having four and five, and instances have been known of eight. These hardy animals propagate without the care of man, and seek refuge from storms among the caverns of the coast during the winter season.

ICELAND MOSS. This lichen, though a native of the higher mountains of the northern parts of Britain, is procured mostly from Norway and Iceland, on the lava of the west coast of which latter country it abounds and attains a large size. When dry it has scarcely any odor, and the taste is bitter and unpleasant. The powder or flour is of a whitish gray. When the bitter principle is removed, the starchy matter differs from wheat flour in nutritive properties, though some authorities assert that a soup made of it is twice as nutritive as one made with flour. Certain it is that the

inhabitants of Norway Lapland, and above all Iceland, use it extensively as an alimentary substance, the latter regarding it as the gift of a bountiful Providence, which sends to them this bread in that frozen clime. It is submitted to no other preparation than repeated steepings in cold water, drying, and powdering; after which it is either made into cakes or boiled in milk. The excellence of Iceland Moss depends upon its freshness, and freedom from accidental impurities, which should be carefully removed before it is used.

IDLENESS. In China it is a maxim, that if there be a man who does not work, or a woman that is idle, in the empire, somebody must suffer cold or hunger; the produce of the lands not being more than sufficient, with culture, to maintain the inhabitants; and therefore, though the idle person may shift off the want from himself, yet it must fall somewhere. The court of Areopagus at Athens, punished idleness, and examined every citizen how he spent his time. The intention was that the Athenians, knowing they were to give an account of their occupations, should follow only such as were laudable, and that there might be no room left for such as lived by unlawful arts.

INCOMBUSTIBLE CLOTH. M. Magellan informs us that the Romans enclosed dead bodies in cloth of this kind. In 1756 or 1757 he tells us, that he saw in the Vatican a large piece of asbestos cloth, found in a stone tomb, with the ashes of a Roman, as appeared by the epitaph. The under-librarian, to show that it was incombustible, lighted a candle, and let some drops of wax fall on the cloth, which he set on fire with a candle in his presence, without any detriment to the cloth. Its texture was coarse, but much softer than he could have expected.

INCUBATION. Birds, fishes, insects, worms and reptiles, as is well known, lay eggs, from which the young animals are produced by means of warmth. The four last named classes leave the fecundation of the eggs to the warmth of the sun; birds employ the warmth of their own bodies for this purpose. The process which they use is called incubation. All known birds, with the exception of the cuckoo, discharge this office themselves. The cuckoo deposits its eggs in the nest of the hedge-sparrow and other small birds. The ostrich, contrary to the common opinion, sits upon its eggs, the male in company with several females, day and night. Birds in general become comparatively tame during this period. Others defend their nests with the greatest courage. The domestic hen boldly encounters the largest dog. Only a few birds living in a state of freedom, allow their nests to be disturbed. Many desert them entirely, if a man has displaced the eggs during their absence; for instance, the canary bird. The gradual development of the young bird in the egg has been observed, particularly in the case of the eggs of the domestic hen.

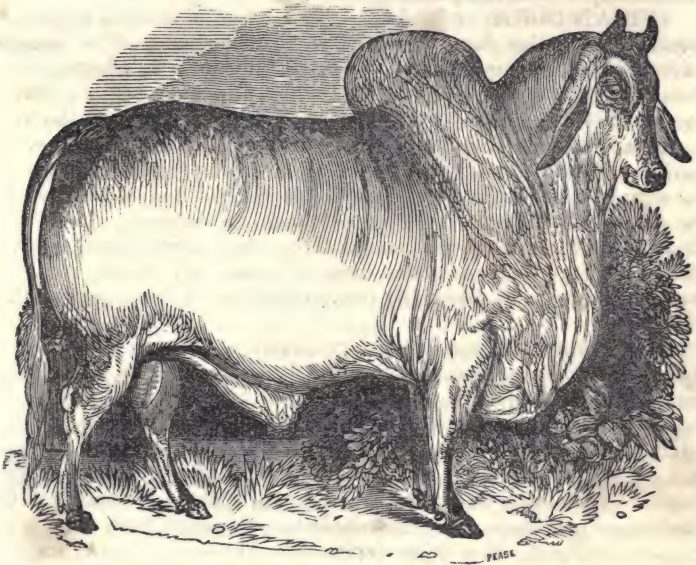
The covering of the young bird, when it first leaves the egg, is a sort of down; this is gradually superseded by feathers. The little creature remains for some hours or longer in the nest under its mother, till it has become accustomed to the external air. The old birds, particularly the female, now manifest the greatest care for their young, in protecting them and providing for their wants. They bring them suitable food, which, when necessary, the mother softens first in her crop. Water and marsh birds, soon after birth, leave the nest, and follow their mother into the water. The old birds teach them where to find their food. The mother protects them, takes them in stormy weather under her wings, and exposes herself to much inconvenience to save them from suffering.

The time of incubation generally varies with the size of the birds. The linnet requires but fourteen days, the common hen twenty-one, and the swan forty-two days. In warm climates, the time of incubation is said to be somewhat shorter. In Africa, the hen is said to sit but thirteen days. With us, too, in very cold weather, geese and hens are known to sit much longer than in warm. The warmth required for fecundating the eggs is about one hundred and four degrees Fahrenheit. The artificial hatching of eggs is practised in Egypt. Ovens for this purpose are made of brick, and sunk some depth in the earth. They consist of two stories, connected with each other, and divided into several apartments. In a corner of the building is an oven, which is heated daily three to four hours, for ten days in succession, with cow and camel's dung, the usual fuel of the country. The heat is regulated by the feeling of the superintendent. The temperature to be produced is compared with the warmth of baths. When the heat is too great, some passages are opened for the air. The floors of the divisions or apartments are covered with mats, and a layer of straw thereupon, on which the eggs are laid, so, however, as not to touch each other.

IN-AND-IN BREEDING. This is a term applied by the breeders of animals, to that kind of propagation where both are of the same blood, and the nearest possible. Although some of the most decided improvements have been made by following this system of breeding—in-and-in—yet it has only been done by the most judicious selections, and the exercise of cautious judgment, while in the hands of the ordinary breeder it is sure to run out a stock, degenerating them rapidly, rendering the males impotent in many cases, and the females of little value as nurses or breeders. Experience seems to have proved, that crosses of the same variety of animals, but of another family, have made the best animals. In some cases, where there is a marked superiority in any race of animals, which it is wished to retain, a cross with a race less perfect in some respects, perhaps, but more vigorous, making what Berry calls a strong cross, and then breeding directly back to the favorite blood, has been very

successful. The first attempts to improve the short horns and the Berkshires, received serious checks from their system of in-and-in breeding, and both Berry and Collings found it necessary to give more vigor and constitution to their animals, by an infusion of different, and in some respects inferior blood.

INDIAN CATTLE. There can be little doubt the Zebu, or Indian Ox, is merely a variety of the common ox, although it is difficult to ascertain the causes by which the distinctive characters of the two races have been in the process of time gradually produced. The



ZEBU, OR INDIAN OX.

only circumstances, in which the two animals essentially differ, consist in a fatty hump on the shoulders of the Zebu, and in a somewhat more slender and delicate make of the legs. Numerous breeds of this humped variety, progressing in size from that of a large mastiff dog, to that of a full grown buffalo, are spread, more or less extensively, over the whole of southern Asia, the islands of the Indian Archipelago, and the eastern coast of Africa, from Abyssinia to the Cape of Good Hope. In all these countries, the Zebu supplies the place of our ox, both for labor, and as an article of food. In some parts of India, it also executes the duties of the horse, being either saddled and ridden, or harnessed to a carriage, and performing in this

manner journeys of considerable length with tolerable facility. They will travel, with a rider on their back, fifteen or sixteen hours in a day, at the rate of six miles an hour. So it has been stated by early writers ; but later ones reduce their daily travel to half that distance. Their action is particularly fine—nothing like that of our cattle, with the sideway circular of their hind legs. They are very active in travelling and leaping, bringing their hind legs under them in a straight line like as the horse does. Their most common color is a light ashy gray, passing into a cream color or milk white ; but it is not unfrequently marked with various shades of red or brown, and occasionally it becomes perfectly black.

INDIAN CORN, or MAIZE. This grain is too well known to require a particular description. The native country of it remains undetermined. It is usually attributed to America, where it was cultivated by the aborigines at the time of the discovery ; but no botanist has hitherto found it growing wild in any part of the new continent ; and most certainly it did not so exist in any portion of the territory of the United States. It is also certain that its culture did not attract notice in Europe, Asia, or the north of Africa, till after the voyage of Columbus. It was unknown to ancient Greek and Roman writers, and is not mentioned by the earlier travellers who visited China, India, and other parts of Asia and Africa, and who were very minute in describing the productions of the countries they visited.

Indian corn is now very extensively cultivated, not only in America, but throughout a great part of Asia and Africa, and also in several countries in the south of Europe, as in Spain and Italy. In many of the provinces of France, it forms almost exclusively the sustenance of the inhabitants. It requires a warm climate, a rich soil, and good cultivation. Under these circumstances it yields a large crop. As generally as it is produced in this country, the valley of the Mississippi is perhaps more favorable to its growth than any other part of the world. It is there cultivated with so much ease, requires so little labor, and the yield is so great to the acre, that there is no fixing limits to the amount which will there be raised in coming time.

IRON. One of the most useful and abundant, and one of the first metals that was known and worked. This metal is easily oxidized, but is infusible, except by an intense heat ; it is, however, malleable at a less degree of heat, and several pieces may be united into one mass, by a process called welding. Iron is the only metal that is susceptible of magnetic attraction. Pure iron is very rarely to be found ; the principal varieties of iron are the cast or pig iron, or that which is immediately extracted from the ore ; wrought iron, that which has gone through the process of melting in a furnace ; and steel, that which has been heated in charcoal, and hardened by its combination with carbon.

IRRIGATION. The importance of water to vegetation is known to every farmer, yet very few are the instances in which this natural want is supplied by artificial means. In most cases, by a wise dispensation of Providence, showers supply the requisite moisture, and of all water that can be applied to plants, rain water is found the most suitable; but there are some soils and some crops which require more water than others, and which are greatly benefited by artificial supplies. Thus the drifting sands of Arabia are arrested and covered with vegetation by water; the rice fields of India and the South, are flooded to secure a crop, and irrigation, or an occasional flowing of water from brooks, rivers, or springs, over meadows, is found to add much to their productiveness. All water contains more or less matter essential to plants. The soluble salts, the finely divided organic matters, and the richest parts of all soils are continually passing away in the streams by which our fields are watered, and it is this cause which forms one of the drawbacks on their fertility.

To arrest and detain these matters from passing away and being lost to the soil, is another important end of irrigation. The more foreign matter any water contains, the more valuable it will be for irrigation; thus river water is better than that of springs, and rivers below large towns, are found to act more efficiently than those above. Of this there is abundant evidence in the use of the Thames' water below and above London, and particularly the celebrated Craigintinny meadows below Edinburgh. Water generally contains sulphate of lime, at least all hard waters do, and a single flowing of a meadow with such water for a few days, besides the other materials it deposits, will leave more of this sulphate or plaster, than is usually applied per acre by farmers. Some of the best meadows and lands of England, have been formed by flowing them and increasing the deposit until poor lands have become like the richest alluvion. In this country, few instances of irrigation have as yet been attempted, but where it has been done by system, and with reference to permanent results, they have proved most successful; and the practice, as the soils become older, and other methods besides manuring become proper to promote fertility, will doubtless be common.

ISINGLASS. This substance is almost wholly gelatin; one hundred grains of good dry isinglass containing rather more than ninety-eight of matter soluble in water. Isinglass is made from certain fish found in the Danube, and the rivers of Muscovy. Willoughby and others inform us, that it is made of the sound of the Beluga; and Nuemann, that it is made of the Huso Germanorum, and other fish, which he has frequently seen sold in the public markets of Vienna. Mr. Jackson remarks, that the sounds of cod, properly prepared, afford this substance; and that the lakes of America abound with fish from which the very finest sort may be obtained.

Isinglass receives its different shapes in the following manner:—

The parts of which it is composed, particularly the sounds, are taken from the fish while sweet and fresh, slit open, washed from their slimy sordes, divested of a very thin membrane which envelopes the sound, and then exposed to stiffen a little in the air. In this state they are formed into rolls about the thickness of a finger, and in length according to the intended size of the staple; a thin membrane is generally selected for the centre of the roll, round which the rest are folded alternately, and about half an inch of each extremity of the roll is turned inwards. Isinglass is best made in the summer, as frost gives it a disagreeable color, deprives it of weight, and impairs its gelatinous principles. Isinglass boiled in milk, forms a mild nutritious jelly, and is thus sometimes employed medicinally. This, when flavored by the art of the cook, is the blanc-mange of our tables. A solution of isinglass in water, with a very small proportion of some balsam, spread on black silk, is the court-plaster of the shops.

IVORY. The tusk, or tooth of defence of the male elephant. It is an intermediate substance between bone and horn, not capable of being softened by fire, nor altogether so hard and brittle as bone. Sometimes it grows to an enormous size, so as to weigh nearly two hundred pounds. The entire tooth is of a yellowish, brownish, and sometimes a dark brown color on the outside; internally white, hollow towards the root, and, so far as it is inserted into the jaw, of a blackish brown color. The finest, whitest, smoothest, and most compact ivory comes from the island of Ceylon. The grand consumption of this commodity is for making ornamental utensils, mathematical instruments, cases, boxes, balls, combs, dice, and an infinity of toys. The coal of ivory is used in the arts under the denomination of ivory-black. Particular vessels are used in the manufacture of this pigment, for the purpose of rendering it perfectly black. Some travellers speak of the tooth of the sea-horse as an excellent ivory; but it is too hard to be sawed or wrought like ivory. It is used for making artificial teeth.

JACKAL. There is no essential difference between the dog and the jackal, as they will breed together, producing prolific offspring. This species of quadrupeds is very widely extended throughout the warmer regions of the old world. It is found in Africa, from Barbary to the Cape of Good Hope; in Syria, in Persia, and throughout all southern Asia. It is about two feet and a half in length, and about fourteen inches in height; the length of the tail, about eight inches; the eyes are small; the tail bushy; the head, neck, sides of the belly, thighs, and outer parts of the limbs and ears, of a dirty yellow; underneath, and on the sides of the lower jaw, the end of the upper lip, under the neck and belly, and the inner surface of the limbs, somewhat white; the back and sides of the body, to the tail, of a gray yellow, which is abruptly divided from the surrounding lighter colors; the tail a mixture of yellow and black hair, the black prevailing at the extremity. The muzzle and nails, black.

All travellers who have been in the countries where the jackals are found, mention the ravages they commit, and, their dreadful nocturnal cries, which, answered as they are by all their companions, produce the most appalling effects. Their voice has often been described as more terrific than the howl of the hyæna or the roar of the tiger, and deprives of repose all hearers who have not been long accustomed to it. The jackal can be tamed with tolerable facility, but always preserves an extreme timidity, which he manifests by concealing himself on hearing the slightest unusual sound, or at the sight of a person he is unaccustomed to. This fear is different from that of most wild animals, and he closely resembles a dog in fear of chastisement, for he will offer no resistance when he is touched.

The most celebrated commentators on the Bible, consider the three hundred animals, to whose tails Samson tied firebrands, were jackals. This opinion is grounded on the great number of these animals found in Syria, and on their assembling in large flocks; whereas the fox is comparatively scarce, and is always solitary. The jackal has been popularly termed the lion's provider, from an opinion that it rouses the prey for that quadruped. The fact appears to be, that every creature in the forest is set in motion by the fearful cries of jackals; the lion and other beasts of prey, by a sort of instinct and the call of appetite, attend the chase, and sieze such timid animals as betake themselves to flight at the voice of this fearful pack. Buffon gives the following description of the jackal;—It unites the impudence of the dog with the cowardice of the wolf, and participating in the nature of each, is an odious creature, composed of all the bad qualities of both.

JANUARY. The first month of the year, among the western nations, is from the Latin word *Januarius*—a term given to it from *Janus*, one of the Roman divinities; or rather perhaps from *Janua*, a Latin word signifying gate, the first month being, as it were, the gate of the year. *Numa Pompilius* made *January*, *Romulus March*, the first month in the year.

JAUNDICE. Is a disease of which the distinguishing peculiarity is, that the whole skin becomes yellow. It proceeds from some disease about the liver or its communication with the bowels. The internal symptoms are those of all disorders of the digestive organs, except that the water is dark and loaded with bile, while the bowels appear to be deprived of it. The yellow color is first perceptible in the whiter parts of the body, as the white of the eye, and soon over-spreads the whole body. There is often an extreme itching and prickling over the whole skin. After the disease has continued long, the color of the skin becomes gradually deeper and darker, till the disease becomes, at last, what is vulgarly called the black jaundice. This appearance arises from the bile being retained, from various causes, in the liver and gall-bladder, and thus being absorbed and circulated with the blood. It may be produced by obstacles to the

passage of the bile of various kinds, and is often suddenly induced by a violent fit of passion, or more slowly by long continuance of melancholy and painful emotions.

The jaundice also attacks horses and cattle, and sometimes becomes quite intractable and dangerous. It is usually occasioned by some obstruction in the ducts and tubes which convey the bile from the liver to the intestines. The disease is easily detected by the yellowness of the eyes and mouth, and of the skin generally; the urine is high colored, and the appetite is impaired. In the ox or cow, the disease is more difficult of management, and more frequently proves fatal, than in the horse. Bleeding and purgatives are required; but for the purgative Epsom salts are to be preferred to any other. Some have recommended as a certain cure for this disease, when taken in season, two ounces of flour of mustard, mixed with some liquid, and given twice in twenty-four hours. As all animals are more liable to be attacked in Spring, than at other times, it proves that green food of some kind is essential to their health, and it is probable that roots will be one of the most effectual preventives of this disease. If the system becomes inflamed or feverish, bleeding must be resorted to, and there are few cases of jaundice in which it would not be useful.

JELLY. Is a form of food, or medicine, prepared from the juice of ripe fruits, boiled to a proper consistence with sugar; or the strong decoctions of the horns, bones, or extremities of animals, boiled to such a height as to be stiff and firm when cold, without the addition of sugar. The jellies of fruits are cooling, saponaceous, and accrescent, and therefore are good in all disorders of the primæ viæ, arising from alkaliescent juices. Jellies made from animal substances are all alkaliescent, and, therefore, good in all cases in which an acidity of the humors prevails; the alkaliescent quality is, however, in a great measure taken off by the addition of lemon juice and sugar. A sort of jellies were formerly much in use, called compound jellies; these had the restorative medicinal drugs added to them, but they are now seldom prescribed.

JESUITS' BARK. Or Peruvian Bark, an invaluable drug, used with great success in 'intermittent fevers. The tree which produces it, grows chiefly in Quito, a province of Peru. It is about the size of a cherry tree, and bears a kind of fruit resembling an almond; but it is only the bark that possesses those excellent qualities for which it is so much celebrated. It is said that the medicinal virtue of this bark was discovered in the following manner. Several of the trees were felled for other purposes into a lake, when an epidemic fever of a very mortal kind prevailed at Loxa, in Peru; and the woodmen accidentally drinking the water were cured. Some Jesuits carried this bark to Rome, about the year 1639.

JET. In Natural History, a bituminous substance, which Magellan supposes to be similar to amber, differing only in its color,

which is black. Great quantities of it have been dug up in the Pyrenees ; and it is also found in parts of Portugal, Spain, Italy, Germany, Prussia, Sweden, and Ireland. It bears a good polish, and is made into trinkets. It is also reduced into powder, formed into a varnish, and, when mixed with lime, it is an extremely durable cement.

JOINTS. The joints of the human body are called by anatomists articulations. The suppleness to which the joints may be brought by long practice from infancy is very surprising. One of the most wonderful instances was a person of the name of Clark, and famous for it in London, where he was commonly known by the name of "Clark, the posture-master." This man, by long practice, distorted many of the bones, of which nobody before had ever thought it possible to alter the position. He had such an absolute command of his muscles and joints, that he could almost disjoint his whole body ; so that he once imposed on the famous Mullens by his distortions, in such a manner, that he refused to undertake his cure ; but, to the amazement of the physician, no sooner had he given over his patient, than he saw him restore himself to the figure and condition of a proper man, with no distortion about him.

JUICES OF PLANTS. The proper juice of plants, that which is essential to their growth and nutrition, is the sap, after it has undergone the changes consequent on being received into the circulation of the plant. It seems to be elaborated from the sap, by the vital power of the plant, and hence varies much in different plants. In some, it is sweet, as the sugar maple ; in others, acrid or corrosive, as in the wild parsnip ; in others, narcotic, as in the poppy ; in others, aromatic, as in cinnamon. The color of the proper juices of plants, varies as much as their qualities. In the milkweed it is white, in the periwinkle green, in the celandine yellow, in bloodroot or logwood red, and in others clear and pure. The medicinal qualities principally reside in their proper juices, of which the balsam and turpentine of the fir and pine, are familiar instances.

Although it was long doubted, it now seems to be generally admitted, that there is a proper circulation of the juices of plants, as the result of their organization. Indeed, in some plants this current is clearly seen, by the microscope, as is exhibited in the plates of Roget's Vegetable Physiology. Such a function, in some form, seems necessary, or plants would be unable to free themselves from unnecessary or adventitious matters which are taken up by the sap, as it is clear they do by the process of excretion. Professor Knight's account of this circulation and its results, in substance, is as follows :—When the seed is planted under favorable circumstances, moisture is absorbed, and slightly modified by the cotyledons, is conducted to the radicle, mingled with that continually taken up from the soil, ascends to the plumelet, which now expands, and gives the due preparation to the

ascending sap, which is returned in its elaborated state to the tubes of the bark. Through this it descends to the root, forming in its progress new bark, and new alburnum, thus completing the circulation.

JULIAN YEAR. A space of time consisting of three hundred and sixty-five days and six hours, so called from Julius Cæsar, by whom it was established. The calendar, which contained an account of Julian time, was called the Julian Calendar; and the time when it was first instituted, namely, 46, A. C., the Julian Epocha.

JULY. The seventh month, from the Latin word Julius, said to be derived from Julius Cæsar, who was born in this month; Mark Anthony first gave the name Julius to it; it was called before Quintilis, from being the fifth month, according to the old Roman calendar; for the same reason August was called Sextilis, or the sixth. Abundant objects will now excite our pleasure, in our walks through the numerous and variegated fields of nature; whether it be over the lately close shorn meadow, the promising and ripening cornfield, or the uplands and lofty hills, where the heath sheds a purple tint over the swelling undulations; the furze and the broom still wave their beautiful yellow blossoms; and the whortleberry modestly hanging beneath its olive green leaves; or in the shady wood, secluded from the now intense rays of the powerful sun.

The fruits of the garden, gooseberries, currants, raspberries, and cherries, are now fully ripe; the lilies of many kinds are now in their splendor; the hollyhock, the convolvulus, the sunflower, and innumerable cultivated plants, offer their fragrance or their colors to our senses. The bindweed, with companulate flowers of snowy white, adorns every hedge; the scarlet poppy, the waving corn. Of flowering shrubs, the Spanish broom and syringa may be named. Of the numerous culinary vegetables now scattered before us in profusion, we cannot speak; they offer a rich variety for every taste.

JUNE. The sixth month in the year, called by the Romans Junius. This month offers to him who is fond of the country—and who with unadulterated taste is not?—several agreeable sources of pleasure; the air is always bland, generally even hot; and the agricultural operations of hay making and sheep shearing excite, in a sort of festal activity, at once to pleasure, to business, and to employment. Fragrance, in the country, may be an appropriate term for this month; whether it be exhaled from the variegated flowers of the meadow, the fields of clover, of beans, or of hay; or whether from the garden with the rose, the jessamine, the sweet william, the sweet pea, and the woodbine; add to these, not indeed of much fragrance, but of various and numerous dyes, the larkspur, the candy tuft, nasturtiums, poppies, canterbury bells, the lychnis, and lilies of many kinds. The pink, carnation, and stocks, of infinite hues, embellish the borders of him who is disposed to become a nurse for these beautiful children of nature; and imparts also their varieties of odor along with the flower

le luce, one species of which, with extreme delicacy of scent, should never in a garden be omitted. Towards the end of this month, many of the singing birds cease their notes; the nightingale, in particular, is scarcely, if ever, heard after the thirtieth; nor is the cuckoo often, though occasionally, later in song. Migratory and other birds are now busy in the work of incubation. In this month, also, some fruits are ripe, among which the cherry and the strawberry are the chief.

JUNIPER TREE. A sort of tree or shrub, having long, narrow, and prickly leaves, and bearing a soft pulpy berry. This shrub is common on heaths and barren hills, but the berries, which are used medicinally, are brought from Germany. From the berries is made, in Holland, the gin called Holland gin.

KAMSIN. The name of a hot southerly wind, common in Egypt. The wind is said to prevail more or less for fifty days, hence it is called "the wind of fifty days." Travellers who have experienced the effect of it have described it as a poisonous wind. When it begins to blow, the atmosphere assumes an alarming appearance. The sky, at other times so clear in this climate, becomes dark and heavy; the sun loses its splendor, and appears of a violet color; the air is not cloudy, but gray and thick, and is filled with a dust so subtle, that it penetrates everywhere.

This wind, always light and rapid, is not at first remarkably hot, but it increases in heat in proportion as it continues. All animated bodies soon discover it by the change it produces in them. The lungs, which a too rarified air no longer expands, are contracted, and become painful. Respiration is short and difficult, the skin parched and dry, and the body consumed by an internal heat. In vain is recourse had to large draughts of water; nothing can restore perspiration. In vain is coolness sought for; all bodies, in which it is usual to find it, deceive the hand that touches them. Marble, iron, water, notwithstanding the sun no longer appears, are hot. The streets are deserted, and the dead silence of night reigns every where. The inhabitants of towns and villages shut themselves up in their houses, and those of the desert in their tents, or in wells dug in the earth, where they wait the termination of this destructive heat. It usually lasts three days, but if it exceeds that time it becomes insupportable. The danger is most imminent when it blows in squalls; for then the rapidity of the wind increases the heat to such a degree as to cause sudden death. This heat is a real suffocation. The lungs, being empty, are convulsed, the circulation is disordered, and the whole mass of blood driven by the heat towards the head and breast; whence the hæmorrhage at the nose and mouth, which happens after death.

KANGAROO. An animal of New South Wales, four or five feet long, with a tail three, weighing one hundred and fifty pounds. Its usual position is standing on its hind feet, its fore feet being employed like those of the squirrel. It lives on vegetables, and instead of walk-

ing, leaps fifteen feet at a time. The limbs of the Kangaroo are strangely disproportioned ; the fore legs being small and short, whilst the hinder are long and powerful. The tail is very thick at its base, gradually tapering, and appears to act as a supplemental limb, when the animal assumes its usual erect or sitting posture, in which position it is supported by the joint action of the tail and its hinder legs. This conformation also enables it to take amazing leaps. They use their tails and hinder feet as weapons of defence. When they are pursued and overtaken by dogs, they turn, and seizing them with their fore-feet, strike them with their hinder extremities, and often tear them to such a degree as to destroy them.

KELP. In Commerce, the ashes of sea weeds. On the Scottish coast, the sea weed is cut close to the rocks, during the summer season, and afterwards spread out upon the shore to dry, care being taken to turn it occasionally, to prevent fermentation. It is then stacked for a few weeks, and sheltered from the rain, till it becomes covered with a white saline efflorescence, and is now ready for burning. This is usually accomplished in a round pit, lined with brick or stone ; but the more approved form for a kiln is oblong, about two feet wide, eight to eighteen long, and from two to three deep : the bottom of this is covered with brush, upon which a little dried sea weed is scattered, and fire is applied at one extremity ; the sea weed is now thrown on gradually, as fast as the combustion reaches the surface, and, should there be much wind, it is necessary to protect it by covering the sides with sods ; after the whole is burnt, the mass gradually softens, beginning at the sides, when it should be slowly stirred up with a heated iron bar, and incorporated, till it acquires a semifluid consistence. This part of the process requires considerable dexterity ; and, if the mass continues dry, a little common salt should be thrown on, which acts as a flux. When cold, it is broken up, and is now ready for sale.

Notwithstanding that kelp contains but two or three per centum of carbonate of soda, while Spanish barilla often contains twenty or thirty, the manufacture of this article has increased prodigiously on the northern coasts of Great Britain and the neighboring islands. Small farms on the Orkneys, which formerly rented for forty pounds a year, have now risen to three hundred pounds, on account of their kelp shores ; and so much importance is attached to this branch of business, that, along sandy shores, stones have been placed within the flood-mark, which, in a short time, become covered with sea weed. Many thousand tons are thus manufactured annually, and are sold in the various parts of Great Britain, at the rate of from seven to ten pounds per ton. New England, being the only part of the United States which has a rocky coast, would seem to be the only part of our country fitted for the manufacture of kelp. The greater rise of the tides north of Cape Cod, and especially in the more eastern parts, is

also a favorable circumstance ; indeed, this branch of business has been carried on in the state of Maine.



KERRY COW.

KERRY CATTLE. The cattle of this name belong to Ireland, and have some distinctive attributes which entitle them to notice. They are found on the mountains and rude parts of the country, in almost every district. The horns are of medium length, between what are technically denominated Short Horns and the Irish Long Horns. Usually their horns are upright, and project forward. Their hair is coarse and long ; they are black, brindled, and black or brindled, with white faces. They are exceedingly hardy, living through the winters on their native mountains and moors ; and when removed to more favored situations, they fatten with rapidity. They are small, especially when in their native localities ; but, when favored with a better climate and soil, and improved by crosses, their size is increased. The cow of this breed is emphatically called the poor man's cow, because she is so easily kept, and because she yields, considering her size, a fair quantity of milk, which is of an excellent quality.

KITE. A migratory bird in various parts of Europe ; in England it is said to continue the whole year. It preys chiefly upon small birds ; and from a distance in the air, at which it is invisible to the sight of man, it will pounce upon them with incredible rapidity and

fatal precision. It makes frequent depredations on broods of young chickens, and furnishes hereby an interesting spectacle of maternal affection and courage in the hen. From these conflicts the kite sometimes retires worsted.

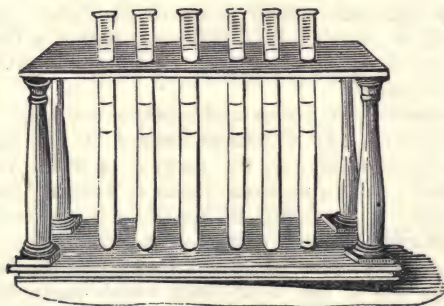
KETCHUP. This is a well known preparation from the mushroom and other plants, used as a condiment for flavoring, differs greatly in its ingredients and manufacture, according to the chief substance which gives it a name. The best articles for it after mushroom, are tomato and walnut. To the juice of these vegetable substances, there is added vinegar with a seasoning of cloves, pepper, ginger, pimento, salt, and whatever else may be deemed agreeable to the taste.

LABOR SAVING MACHINES. Montesquieu somewhere regrets the introduction of the use of water mills for grinding corn, instead of the hand mills formerly in use, as it threw a great many laborers out of employment, besides diverting the water from the purposes of irrigation. Upon this principle of throwing laborers out of employment, the English weavers were opposed to the use of the power looms. It is not remarkable that laborers themselves, who, for a time, feel the inconveniences of the introduction of any improvement, should oppose its introduction; but it is singular that any man of enlarged and philosophical views should fall into such a notion. Nobody certainly would think it a misfortune to a community, that, in consequence of some improvement in agriculture, the same labor would produce a greater crop of grain; on the contrary, every one consents to the praise bestowed, by Johnson, upon the man who makes two blades of grass grow where only one grew before. And an improvement in machinery, whereby the same labor will produce twice the quantity of cloth, is precisely the same in its general effects upon the condition of the community, as an improvement in agriculture.

Improvements in agriculture are much promoted by labor-saving implements. Much of the time that was formerly consumed in the use of the spade is now prevented by the application of the plough. What formerly occupied a stout laboring man a month can now be done by a good span of horses in two days. There is perhaps as much gained by the horse-drill in sowing and planting seed, over the former tedious processes of doing it. The cultivator between the rows of corn instead of the hoe is productive of similar advantage. So is the horse power applied to reaping, raking hay, thrashing and winnowing grain, and sawing wood. Indeed, in whatever department of labor, whether by machinery in the mechanic arts, or by implements in agriculture, the individual is a common benefactor, who enables one man to perform the labor that previously required a plurality of men. By this means the quantity of products is increased and the cost of them diminished in a corresponding ratio.

LACTEALS. A set of vessels which convey a milky fluid, whence they derive their name. They arise from the cavity of the intestines, from minute beginnings which elude the eye. The milky fluid which they carry is the chyle, elaborated from the food after it has passed the stomach, and has been mixed in the duodenum with the bile and pancreatic fluid. The lacteals charged with chyle pass through the glands of the mesentery, where some change is probably made upon it; thence it is conveyed by the lacteals into the receptacle of the chyle, then to the thoracic duct, by which it is carried to the left subclavian vein, to be afterwards incorporated with the blood in the lungs.

LACTOMETER. This is an instrument to ascertain the quality of milk; or the proportion which the cream bears to the milk, of any particular cow. The lactometer consists of any number of glass tubes, half an inch or more in diameter, and eleven inches in length, fitted into an upright wooden frame; each tube having a line drawn around it, ten inches from the bottom; three inches from the line downward;



LACTOMETER.

it is graduated into inches and tenths of inches. Each tube, at the time of milking, is to be filled up to the top line, with the milk of a particular cow. To make the test as accurate as possible, the milk should be taken as soon as drawn from the cow, and from the middle of the pail, which may be done by dipping a small pot or vessel below the froth. After standing twelve hours, the quantity of cream which floats upon the surface will be shown by the scale of inches and tenths marked on the tubes. Thus, it will readily be seen what is the relative richness of milk from each of the different cows; what proportion yielded by each one is cream.

LAMA. An animal of Peru and Chili, resembling the camel. Like the camel they have the faculty of abstaining from water, and like that animal their food is coarse and scanty. They travel, though

slowly, long journeys in countries impassable to most other animals, and are much employed in transporting the rich ores, dug out of the mines of Potosi, over the rugged hills and narrow paths of the Andes. They lie down to be loaded, and, when weary, no blows can excite them to quicken their pace. They neither defend themselves with their feet nor teeth; when angry, they have no other method of avenging injuries but by spitting. They can throw out their saliva to the distance of ten paces; and if it fall on the skin it raises an itching, accompanied with a slight inflammation.

LAMP. A well known apparatus for producing artificial light. A lamp in the most simple form, has a wick, composed of several cotton threads, partially immersed in oil, contained in a flat dish, furnished with some small support, to hold the upper end of the wick in a perpendicular direction, a small height above the surface of the oil; this oil holder, or dish, when suspended in a globular glass case, is the common street lamp. When the wick is lighted, by the application of a burning torch, the heat of its flame causes the oil, which is contained in the wick, to boil, or rise in vapor; and the combustion of this vapor is the flame which produces the light. As fast as the oil in the wick is carried off, by this evaporation, a fresh supply is drawn up, by the capillary attraction of the wick, from the oil contained in the oil-holder.

Hence, it appears that lamps and candles are both of the same nature as gas-lights. The difference consists in the materials from which the gas is extracted, and the manner in which the extracting of it is performed; but in all cases, flame is nothing more than the combustion of gas. In gas-lights, an apparatus is previously employed, to make and preserve the gas, and to conduct it to the place where artificial light is to be obtained from its combustion; but in lamps and candles, the heat of the same flame which produces the light, is employed to vaporize the combustible matter, and form gas for its own maintenance. The difference between lamps and candles is, that lamps are supplied with the combustible matter in a fluid state, but candles are supplied with a solid material; and the heat of the flame must first be employed, to reduce the tallow or wax to a fluid state; and this fluid, which forms itself round the base of this wick, sustains the flame just in the same manner as the oil in lamps.

The flame which we employ for artificial light, is produced by the combustion of some gas which contains carbonaceous matter; and it is most probable that the matter, while it burns in these gases, is chiefly composed of particles of carbon in a very minute state of division. Combustion takes place when the carbon combines with the oxygen of the atmospheric air, in the requisite proportion to produce the carbonic acid gas; and if the oxygen is supplied in a less proportion, the oxide of carbon will be produced in the form of smoke or soot. The chief circumstance influencing the combustion of the different carbonaceous

matters which are used for producing light, is the degree of temperature which they require, in order to make them combine with the oxygen of the atmosphere, in sufficient proportion to produce flame.

LAMP-BLACK. This is a coloring substance in very general use for several purposes. The finest lamp-black is produced by collecting the smoke from a lamp with a long wick, which supplies more oil than can be consumed, or by suffering the flame to play against a metallic cover, which impedes the combustion, not only by carrying off part of the heat, but by obstructing the current of air. Lamp-black is prepared, however, in a much cheaper way for the demands of trade. The dregs which remain after the purification of pitch, or else small pieces of fir-wood, are burned in furnaces of a peculiar construction, the smoke of which is made to pass through a long horizontal flue, terminating in a close boarded chamber. The roof of this chamber is made of coarse cloth, through which the current of air escapes, while the soot remains.

LAMPAS. Lampas, or lampers, as many farmers pronounce it, is a difficulty in the roof or palate of a horse's mouth, which prevents his eating except with pain. In a horse, the palate is crossed transversely by bars, and some of the lower ones, or those adjoining the fore teeth, swell, become inflamed, and if they rise higher than the teeth, which, in a young horse, or when he is shedding his teeth, they sometimes will, feeding is impossible. It may also arise at any time from a feverish tendency, but most often when taken up from grass, or when he has been over-fed. It is the custom with some, when a horse has the lampas, to burn them out with a hot iron; and nearly every blacksmith's shop is furnished with an instrument of torture for this purpose. This is a most barbarous practice, and should never be performed. It tortures the animal to no purpose, and it destroys, by rendering the bars callous and hard, that elasticity and sensibility so necessary to safety in managing a horse by the bridle.

In nine times out of ten the inflammation will subside in a few days of itself, and if it does not, a few mashes, or gentle alterative medicines, will relieve him. If they are severe, a few slight cuts or pricks across the bars with a lancet or knife, will cause the inflammation or swelling to subside; but in all operations about the mouth of the horse, care must be taken not to disturb the principal artery or vein of the palate, unless a full bleeding is intended. At times this difficulty of eating arises from either the grinders or tushes endeavoring to make their way through the integuments of the jaw. Examination will show whether this is the case, and if so, a cross cut with a penknife will give immediate relief. Young horses, from the shortness of their teeth, are more subject to the lampas than old ones, but those of all ages are liable to the disease.

LAND REMAINS. A term applied to remains of animals and vegetables, found everywhere on digging in the earth, mostly inter-

changed with strata of marine remains. They consist of bones of animals, or vegetables whose species chiefly are extinct, or whose genera now flourish in warmer climates, the bones being often of animals of enormous size, either because such were common, or because they have endured longer. Vegetables in particular are often found imbedded in coals, and coal seams are in general considered as consolidations of ancient forests. In Iceland a forest was lately found with the trees erect, fifty or sixty feet below the surface of the earth, and prostrate forests have been found in Lancashire and Lincolnshire.

LANDMARK. A mark to designate the boundary of land; any mark or fixed object; as a marked tree, a stone, a ditch, or a heap of stones, by which the limits of a farm, a town, or other portion of territory may be known and preserved. In ancient times the correct division of lands was an object of great importance; and various means were adopted to give distinctness and permanency to the boundaries of every man's property. Stones and hillocks were the most usual landmarks. The importance of this subject among the Israelites particularly, may be judged of from the denunciation of Moses: "Cursed be he who removeth his neighbor's landmark."

LANDSCAPE. A portion of land or territory which the eye can comprehend in a single glance, including mountains, rivers, lakes, and whatever else the land contains. Also, a picture, exhibiting the form of a district of country, as far as the eye can reach, or a particular extent of land and the objects it contains, or its various scenery, is called a landscape. It would be wise when locating houses in the country, to select sites that combine all the elements that can be had for a beautiful landscape. After a judicious choice of site is thus made, the buildings should be designed so as to harmonize with, and give additional effect to the natural scenery. Most persons do not seem to be aware how much pleasure in the course of life they would experience from due attention to this subject. All this costs but little, but it gives commercial value to a country residence, an hundred fold beyond what is expended in outlay for it. What passing traveller does not stop to admire the tasteful and economical cottage, with appropriate outbuildings and fences—with trees and shrubs—with lawns and mounds—with flowers, gravel walks, and terraces—and, also it may be with gurgling rills, or overflowing fountains! It is not to be supposed very many can have enough of these artistic or even natural decorations to deserve the name of landscape gardening; but most persons may indulge themselves a little in such emanations of a well cultivated taste. That an admiration of such scenery is an innate quality of the human mind, is too well known to need proof.

LAND SPRINGS. Land springs are sources of water which only come into action after heavy rains; while constant springs, which derive their supplies from a more abundant source, flow throughout the year. All springs owe their origin to rains. In the case of land

springs, the water when it sinks through the surface, is speedily interrupted by a retentive stratum, and there accumulating soon bursts out into a spring, which ceases to flow a short period after the cause which gave it birth had ceased to operate; but the water which supplies constant springs sinks deeper into the earth, and accumulates in rocky or gravelly strata, which become saturated with the fluid.

LANTERN FLY. This very curious insect measures about three inches and a half, from the tip of the front to that of the tail; and about five inches and a half from wing's end to wing's end, when extended. The body is of a lengthened oval shape, roundish, and divided into several rings. The wings are very large, of a yellow color, elegantly varied with brown. The lower pair are decorated by a very large eye-shaped spot on the middle of each, the border of the spot being red, and the centre half red and white. The head or lantern is a pale yellow with red stripes. This beautiful insect is a native of Surinam, and during the night sheds so strong a phosphoric splendor from its head or lantern, that it may be employed for a candle or torch. It is said that three or four of them tied to the top of a stick are frequently used by travellers for that purpose. A single one gives light enough to enable a person to read.

LAPIDARY. Is chiefly used for an artificer, who cuts precious stones. Dealers in precious stones are rather styled jewellers. The art of cutting these is of great antiquity. Various machines are employed in cutting precious stones, according to their quality. The diamond, which is extremely hard, is cut on a wheel of soft steel, turned by a mill, with diamond dust, tempered with olive oil, which also serves to polish it. The oriental ruby, sapphire, and topaz, are cut on a copper wheel, with diamond dust tempered with olive oil, and are polished on another copper wheel with tripoli and water. Hyacinths, emeralds, amethysts, garnets, agates, and other stones, not of inferior hardness, are cut on a leaden wheel with smalt and water, and polished on a tin wheel with tripoli. The turquois, girasol, and opal, are cut and polished on a wooden wheel with tripoli.

LARCH-TREE. The European Larch is one of the most valuable exotics which has been introduced into Britain. In the north of Scotland it has been grown to a great extent, cultivated with particular attention, and found to be one of the most profitable trees to the planter, provided the land be well drained, but it will not succeed in swampy situations. It grows with great rapidity, is subject to very few accidents, transplants with little risk, and produces timber of great excellence and value. The timber is used for shipbuilding, bridges, dock-gates, and other purposes. The bark is nearly as valuable as that of oak for tanning, and the trunk, when tapped, yields the venetian turpentine.

LARD. The melted fat of the hog is known under this name; it is much used for domestic purposes, in cookery, for ointments, and

for other purposes. Pure lard has little or no taste, and no odor. When long exposed to the air it attracts oxygen, and becomes rancid. It should therefore be kept in air-tight vessels. Within a few years past very large quantities, especially in the Western States, where hogs are numerous, by a chemical process are converted into candles and oil, by many considered equal to the sperm. This will be of immense importance to the country, having already reduced the price of sperm, or put a check upon its advancement. It has been estimated, that in Cincinnati only, lard oil is made at the rate of over a million of gallons per annum. Doubtless the manufacture of it will increase.

LARVA. This is a term applied to that state in which an insect exists immediately after its exclusion from the egg, and before it assumes its distinctive character, or before it becomes a perfect insect. The animals commonly called grubs, maggots, and caterpillars, are larva. The egg of the butterfly produces a butterfly, with the lineaments of its parent, only these are not disclosed at first, but for the greater part of the creature's life, they are covered with a sort of case, or muscular coat, in which are legs for walking; which only suit it in this state, but its mouth takes in nourishment that is conveyed to the enclosed animal; and after a proper time, this covering is thrown off, and the butterfly, that all the while might be discovered in it by an accurate observer, with the help of a microscope, appears in its proper form.

The care of the butterfly tribe to lodge their eggs in safety is surprising. Those whose eggs are to be hatched in a few weeks, and who are to live in the caterpillar state during part of the remaining summer, always lay them on the leaves of such plants as will afford a proper nourishment; but, on the contrary, those whose eggs are to remain unhatched till the following spring, always lay them on the branches of trees and shrubs, and usually are careful to select such places as are least exposed to the rigor of the ensuing season, and frequently cover them from it in an artful manner. Some make a general coat of a hairy matter over them, taking the hairs from their own bodies for that purpose; others hide themselves in hollow places in trees, and in other sheltered cells, and there live in a kind of torpid state during the whole winter, that they may deposit their eggs in the succeeding spring, at a time when there will be no severity of weather for them to combat. The caterpillar state is that through which every butterfly must pass before it arrives at its perfection and beauty. In the study of the insect tribe will be found most curious phenomena.

LAUDANUM. This resinous juice exudes upon the leaves of the *Cistus ladanum* of Linnæus, in Candia, where the inhabitants collect it by lightly rubbing the leaves with leather, and afterwards scraping off and forming it into irregular masses, for exportation. Three sorts of laudanum have been described by authors, but only

two are to be met with in the shops. The best, which is very rare, is in dark colored masses, of the consistence of a soft plaster, growing still softer on being handled. The other is in long rolls, coiled up, much harder than the preceding, and not so dark. The first has commonly a small, and the last a large admixture of fine sand, without which they cannot be collected pure, independently of designed abuses; the dust blown on the plant by winds from the loose sands among which it grows, being retained by the tenacious juice. The soft kind has an agreeable smell, and a lightly pungent, bitterish taste: the hard is much weaker.

LAUREL MAGNOLIA. A large and beautiful tree, that grows on the banks of the Mississippi, and of the river St. Juan. Their usual height is about one hundred feet, and some greatly exceed it. The trunk is perfectly erect, rising in the form of a beautiful column, and supporting a head like an obtuse cone. The flowers of this tree are the largest and most complete of any yet known: when fully expanded, they are of six, eight, and nine inches diameter. They are on the extremities of the subdivisions of the branches, are perfectly white, and expanded like a full blown rose. In the autumn, multitudes of red berries hang down from the branches of these trees, suspended by white silky threads, from four to nine inches in length. The berries have an agreeable spicy scent, and an aromatic bitter taste. The wood, when seasoned, is of a straw color, and harder and firmer than that of the poplar. The grape vines which climb these trees, are frequently nine, ten, and twelve inches in diameter: they twine round the trunks of the trees, climb to their very tops, and then spread along their limbs, from tree to tree, throughout the forest.

LAVENDER. A plant with a shrubby stem, much branched with numerous hoary leaves. The flowers are produced in terminating spikes from the young shoots on long peduncles. The leaves, stalk, and flower, yield a fragrant perfume, and from the latter are prepared an essential oil, a simple spirit, and a compound tincture.

LAWN. Ground covered with the smallest perennial grasses, kept short by mowing, and generally situated in front of a house or mansion. Lawns, when once established, require only to be kept neat by the ordinary routine of rolling, mowing, and sweeping, except keeping the surface perfectly even, by making small hollows with screened mould early in the spring. When lawns become worn out, a top dressing of any finely divided manure will refresh them; leached ashes are particularly useful, and at the same time, an additional quantity of grass seed may be sown.

LEAD. In Mineralogy, a bluish white metal, very soft and flexible, and easily beaten into thin plates by the hammer. In a strong heat it boils and emits flames, and if during that time it is exposed to the air, its oxidation proceeds very rapidly. It is very brittle at the time of congelation. Most of the acids attack lead, but it

unites with most of the metals, particularly tin, which, in union with lead, forms the solder used by plumbers. The carbonate of lead, which is a powder, is better known by the name of white lead ; the red oxide of lead is otherwise called red lead.

LEATHER. This remarkable substance, which is universally employed throughout the civilized world, is prepared from the skins of animals, or, it would perhaps be more correct to say, consists of that substance after it has been chemically changed by the process of tanning. This change is effected by means of a substance residing in several vegetable matters, to which the name of tannin has been given. When this tannin, which is soluble in water, is applied to the hides of animals, from which the hair, epidermis, and any fleshy or fatty parts adhering to them are removed, and which hides then consist wholly of gelatin, also soluble in water, these two soluble substances, so unite chemically, as to form the wholly insoluble substance called leather. Of the ox-hides which are converted into leather, those supplied by bulls are thicker, stronger, and coarser in the grain, than those of cows ; while the hides of bullocks are intermediate between those of the bull and the cow. Such leather is employed for the soles of boots and shoes ; for most parts of harness and saddlery ; for making leather trunks, buckets, hose for fire engines and pump-valves ; for the thick belts used in military accoutrements and machine shops, and for the gloves of cavalry.

LEAVES. In Botany, are membranous or succulent organs, usually of a green color, arising immediately from the root, or attached to the stem and its branches. The point by which a leaf is attached to the plant is termed its base, the opposite extremity is the summit, the intermediate portion of the leaf is its expansion, and the boundary of the expansion is its margin. The superior surface is more even, and usually of a deeper green ; and the other exhibits more prominently the fibres of the diverging vessels.

The magnitude of leaves varies almost as much as their forms. In the mosses which abound in cold climates, they are extremely minute ; and the forest trees of the north are adorned with leaves which appear diminutive when compared or rather when contrasted with the foliage of equatorial plants. There we find the leaves of the banana, perhaps the same which were employed by our first parents, to supply the want of a more artificial dress ; they being, in the opinion of many writers, the "fig-leaves" of sacred history. In Ceylon, a country alternately exposed, for many months in succession, to the rays of a vertical sun, and the inclemencies of an unceasing storm, is found the singular talipot, a single leaf of which is sufficiently large to shelter twenty men from the vicissitudes of the climate in which they dwell. This tree is venerated by those who find beneath its branches so kind a shelter, and travellers consider it as the greatest blessing which Heaven has bestowed on the country. And when we

regard its subserviency to the wants of the human race, it is not surprising that by the ancients, the wide spreading tree, decorated with leaves, and occasionally beautified with flowers, should have been held sacred as the very temple of the deities they worshipped.

It has long been known that leaves are organs of exhalation, from which an invisible vapor continually escapes, capable of being collected, condensed, and accurately examined. The fact is illustrated by a very simple experiment, and we all know that when a branch is separated from its parent stock, it will shortly droop, wither and die. Its weight is diminished, for it is no longer filled with those fluids on which its firmness and elasticity depend. They have been discharged through the pores of the leaves, which, being cut off from all further supply, are sooner or later entirely exhausted. But if a leafy stem be placed in a small vessel of water, its freshness will be preserved a much longer time, though the perceptible and rapid diminution of the water will prove that the leaves have been the outlet through which it has escaped. If the same branch be placed in a close tin box, its freshness will be still longer preserved. Here are no fluids for the stem to absorb, but by confining the air which is already saturated with vapor, we prevent its further escape from the leaves, which must of necessity cease to transpire. They retain the same fluids with which they are already supplied, and though they perform none of the actions, they exhibit the appearance of perfect health. Thus they may be preserved for weeks, and thus the botanical traveller, who expects to derive every advantage from his journey, will collect and preserve the plants that meet his eye, till he has leisure to examine them.

In general, succulent plants exhale more sparingly than others. It seems to have been the design of Nature that they should inhabit the burning sands of the torrid zone, and the peculiarity of their native situation, makes it necessary for them to preserve the fluids, which with so much difficulty they procure. But plants with thin membranaceous leaves, which generally occupy moist situations, where they are supplied with an abundance of water, perspire very copiously. The sunflower, which is very frequently met with in the United States, was found to exhale two pounds in the course of a day; and in the same space of time the cornelian cherry, a shrub with thin and almost transparent leaves, growing in the hedges of Europe, is said to lose a quantity equal to twice its own weight. On a warm summer's day, at a time when there had been no rain for several weeks, Dr. Watson placed some grass under a large vessel, and in two minutes it was covered with moisture which ran down its sides. By collecting it on muslin, he ascertained the amount of this exhalation; and from the result of his experiments, he was led to conclude, that in the course of a day, an acre of land transpires nearly two thousand gallons of water. The rapidity with which plants wither, will teach

us how fast their roots absorb, or their leaves exhale; and in cultivating rare plants, this simple experiment will enable us to determine what quantity of water they require.

LEAVES FOR MANURE. The dead leaves of the forest constitute an admirable manure when rotted in the barn-yard, pig-stalls, or in composts; they have precisely the value of straw, being very similar in their action. The leaves of oaks and plants growing on a rich soil are better than those of pine, or such as grow on poor lands. They should be collected as early as possible in the fall. They might be gathered with rakes and put into stacks of several hundred each in the forest, to remain till the snow falls, when they could be removed to their places of deposit with more convenience than at the period of collecting them, or as they may be needed for litter. If they were to be at once ploughed into the soil, they would form an excellent amendment; but in that case, require rather more time to yield vegetable food. In this case, lime should be applied with the leaves.

LEECHES. The traffic in leeches is a remarkable one, alike for the gatherer and the dealer. The leech is met with more abundantly in the south than in the north of Europe. The country about La Brienne, in France, is famous for its supply of leeches; and here is exhibited the wretched nature of the employment of a leech-gatherer. He has his arms and legs bare, and walks about in the marshes where the leeches abound. They attach themselves to his legs as he moves along, and he picks them off from time to time; he seeks for them also about the roots of bulrushes and sea-weeds. He can on some days gather a groce in three or four hours: and he puts them into a small bag suspended round his neck. Such is the leech-fishery in spring; but in summer it is still worse. The leeches then go into deeper water, and the gatherer strips naked to go after them. These poor fellows are exposed to fogs, mists, and fœtid vapors, and are subject to agues, catarrhs, and rheumatisms; but the trade is tolerably lucrative, and thus there is no scarcity of leech-gatherers. They are sometimes imported in bags, but more usually in small barrels containing about two thousand each: the head being made of stout canvas, to admit the air. It has been estimated that the annual consumption of leeches in Paris is about three millions; and that not less than seven millions are annually carried to London, either for use there or for shipment to other places.

LENS. Is a glass ground into such a form as to collect or disperse the rays of light which pass through it. They are of different shapes, from which they take their names. If rays proceed from a radiant point distant as far as the sun, their divergency is so trifling that they may be considered as parallel. When parallel rays fall on a piece of glass having a double convex surface, that ray only, which falls in the direction of the axis of the lens, is perpendicular to the surface; the other rays falling obliquely, are refracted towards the

axis, and they will meet beyond the lens at a point called its focus. The distance of the focus from the centre of the lens depends both upon the form of the lens, and upon the refractive power of the substance of which it is made; in a glass lens, both sides of which are equally convex, the focus is situated nearly at the centre of the sphere of which the surface of the lens forms a portion; it is at the distance, therefore, of half the diameter of the sphere. The property of a lens which has a double concave surface, is to disperse the rays of light. Instead of converging towards the ray, which falls on the axis of the lens, they will be attracted towards its thick edges, both on entering and quitting it, and will, therefore, be made to diverge. Lenses which have one side flat and the other convex or concave, are less powerful in their refractions, than those which have been described. They are called plano-convex and plano-concave. The focus of the former is at the distance of the diameter of a sphere, of which the convex surface of the lens forms a portion. The last kind of lens is called a *méniscus*, being convex on one side, and concave on the other, like the glass or crystal of a watch.

LENTIL. A species of *ervum*. The common lentil comes from France and the Valais. The thin annual root brings forth weak, creeping, hairy, angular stalks, from one to two feet long, divided, from near the bottom, into several branches, and clinging for support to other plants; the primate leaves stand alternately; from the axils of the leaves proceed fine stalks, which each have two or three whitish flowers, hanging down. The pods do not contain more than two sound seeds, flat upon both sides. Lentils are cultivated for the seeds just mentioned. They require a rather sandy, yet strong soil; they are sown somewhat later than peas and vetches, because they cannot endure night frosts; they are to be sowed in drills, and well harrowed. Care is to be taken that the seed is not put too deep into the ground, and that the young plants are well hoed and well weeded. For the harvest, the time is to be chosen when the little pods begin to turn brown, though the plant may be still quite green; and, if possible, it is best to choose the afternoon of a dry, warm day; for if the pods are quite ripe, or are wet with rain at the time of gathering, they easily crack open, and a great loss of seed takes place.

Two varieties are cultivated—the large garden lentil, and the common field lentil. The former is distinguished by its size, and the greater quantity of mealy substance which it will afford. The straw of lentils is good food for cattle and sheep, particularly for calves and lambs. Lentils are also mixed with vetches, and sowed as food, both green and dried, for milch kine. Lentils, when cooked, afford a nutritious food, (this should be done in the pod, to preserve their flavor) but, like peas and beans, are not good for persons whose digestive powers are weak, particularly if they are not cooked quite soft. They ought to be boiled for two hours and a half. When they are

browned, some butter, and a few onions roasted in butter, are added, also salt; they are then boiled half an hour more. A good soup may also be made of them. Some persons soften the lentils, before cooking, in cold water. Purified rain water is best to cook them in. In the Archipelago, they are one of the principal articles of food. To fatten pigs, lentils are excellent, and, given with other food, increase the milk of cows.

LETTUCE. A smooth, herbaceous, annual plant, containing a milky juice, which has been cultivated from remote antiquity, and is in general use as a salad. The original locality is unknown. The stem grows to the height of about two feet, and bears small pale-yellow flowers; the inferior leaves are sessile, and undulate on the margin. The young plant only is eaten, as it is narcotic and poisonous when in flower. Twenty species of lettuce are known, from various parts of the globe, and one or more of them inhabit the United States.

LICE. There is scarce an animal that does not nourish, under peculiar circumstances, on its skin, hair, wool, or if a bird, among its feathers, some kind of lice. Some have even more than one kind, as the horse, where one kind lives in the short hair, and another in the mane. The causes are various which are deemed favorable to the production and increase of these parasites. Domestic animals kept dirty and not curried; filthy unwholesome stables; dirt and sweat allowed to accumulate on the skin, or contact with one already infected, are named as causes. But experience shows that lice prefer animals reduced by hunger, disease, or bad food, and they frequently appear after malignant or inveterate diseases have left the animal weak and debilitated. On the horse, they more generally fix on the mane and tail, but if numerous, spread over the whole animal; on the ox, they are found on all parts; they run over the whole body of the sheep, and swarm on every part of the bodies of swine. Animals attacked, rub off the hair, wool, and even the skin, in their annoyance, and fall away rapidly from the abstraction of blood and juices, and the restless state in which they are kept.

For the cure of animals infested with lice, some kind of mercurial ointment is most to be depended upon; though there are vegetable washes, such as a decoction of black hellebore and marsh tea, which will kill these vermin. It has been said, where they are not numerous, sifting fine sand over the animal, would speedily drive them off. Snuff, or a decoction of tobacco, is also used with success. For cattle, Youatt recommends the common scab ointment of sheep—one part of strong mercurial ointment and five parts of lard, as a cure for this disease. If a little of this is well rubbed in, instead of a good deal spread over the hair, there will be no danger of salivation, and the cure will be speedy. Infected animals should be kept separate from well ones, both to prevent infection, and the danger of licking where the

mercurial ointment has been newly spread. If fowls are provided with a box containing sand, with a considerable portion of ashes, to dust, or roll themselves in, they will not be lousy, or if they become so, such a box will cure them. It is said also, that, occasionally boiled onions chopped or mashed with corn meal dough for feed, will prevent their being lousy.

LICHEN. The name for an extensive division of plants. They appear in the form of thin flat crusts, covering rocks and the bark of trees, or in foliaceous expansions, or branched like a shrub in miniature, or sometimes only as a gelatinous mass, or a powdery substance. They are called rock moss and tree moss, and some of the liverworts are of this order. They also include the Iceland moss and the reindeer moss; but are entirely distinct from the true mosses.

LIGAMENTS. Strong, tendinous, inelastic, glistening bodies, which surround the joints, and connect bones together, or strengthen the attachments of various organs, or keep them in their places. Every joint is surrounded by a capsular ligament; the tendons at the wrist and ankle are bound down by what are called the annular ligaments. Poupart's ligament, under which the great nerves, artery, and vein pass out from the cavity of the abdomen to the fore part of the inferior extremity, is merely the lower border of the descending oblique muscle of the belly; which tendon is stretched from the fore part of the haunch-bone to the share-bone. In dislocations of joints the capsular ligament is often broken.

LIGHT. Without light, plants may be made to grow, but no longer exhibit the verdure, the texture, or any of the properties of health. Hereafter we shall probably learn, that while the atmosphere is contaminated by the respiration of animals, its purity is restored by the vegetation of plants. But secluded from the light, vegetables are no longer capable of converting a portion of the fixed air to their own use, or of supplying the atmosphere with oxygen, on which its importance to animal life, chiefly, if not entirely depends. By the action of light, the carbon of the fixed air is interwoven with the very texture of the plant, whereby it acquires a greater degree of firmness, and becomes more valuable in the arts. Through its agency, the aromatic and essential secretions are formed, and hence we find them existing in perfection, only in countries which are favored with the perpetual light of summer, or on elevated mountains, where the rays of light meet with no obstruction. There we find the Nutmeg, the Clove, the Cinnamon and the Peruvian barks, all designed to increase the comforts, or diminish the sufferings of humanity; and all owing their chief excellences to the light of the sun.

When prepared to investigate the geographical distribution of the vegetable kingdom, we shall learn the powerful effects of these united causes. Feeble and exhausted in Polar regions, vegetation acquires strength as we approach towards the equator; where its powers can

be estimated, only by the magnificence of its productions. There the light of the sun is more vivid, its heat more permanent and intense, while the soil is equally fertile, and the atmosphere equally pure.

In southern Georgia, an island of the frozen ocean, only two plants have been discovered, and but thirty have been found to grow without cultivation, in the more temperate climate of Spitzberg. How contemptible are these productions, when compared with those of our own climate, or the still more fertile fields of Madagascar! But deprive Madagascar of its heat, and it becomes a second Greenland. Exclude the light of the sun, and like the dark caverns of the earth, it will produce only a few plants, and those of a sickly hue. Destitute of rain, it will be like the deserts of Africa, and unsupplied with air, it will exhibit no vestige of life. We must, therefore, expect, as we recede from the equator, to meet with a constant succession of new plants, but as we advance, we shall find them less numerous and perhaps of inferior beauty and size. And as we ascend above the surface of the ocean, we must be prepared for a similar, though more rapid succession. This was long ago established by the observations of Tournefort, and it has more recently been verified, by the researches of Humboldt and Decandolle.

LIGHTNING. That lightning is really an electrical phenomenon, is now universally admitted. Philosophers had not proceeded far in their experiments and inquiries on this subject, before they perceived the obvious analogy between lightning and electricity. But this hypothesis was first placed beyond a doubt by Dr. Franklin, who, about the close of the year 1740, conceived the practicability of drawing lightning down from the clouds. Various circumstances of resemblance between lightning and electricity were remarked by this philosopher, and have been abundantly confirmed by later discoveries.

LIGNUM VITÆ. Guaiacum or pockwood, a genus of plants, native of warm climates. The common *Lignum vitæ* is a native of the warm climates of America. It becomes a large tree, having a hard, brownish, brittle bark, and its wood firm, solid, ponderous, very resinous, of blackish yellow color in the middle, and of a hot aromatic taste. It is of considerable use in medicine and the mechanic arts, being wrought into utensils, cogs, and various articles of turnery.

LIME. This substance is obtained by exposing chalk, or other kinds of limestone, or carbonates of lime, to a red heat; an operation generally conducted in kilns constructed for that purpose; the carbonic acid is thus expelled, and lime more or less pure, according to the original quality of the limestone remains. In this state it is usually called quick-lime. The purest quick-lime is obtained from the calcination of white marble. Most stones that are soft enough to be scratched with a knife, have a portion of lime. These are what are commonly designated limestone, chalk, marble, spars, gypsum, and various others. When, by ignition they are reduced to the state

called quick-lime, they have a strong tendency to combine with water. Thus if water be sprinkled upon quick-lime, it becomes very hot, and crumbles into a dry powder, and is called slacked lime, or hydrate of lime, owing to the water having become consolidated with it and an essential part of the lime. And when quick-lime has been some weeks exposed to the air, it falls into powder, in consequence of the absorption of the moisture in the air. The uses of lime are various. The most important of them are in the manufacture of mortar and other cements used in building, and as a fertilizing agent in agriculture.

The paste of lime and water, called mortar, has a degree of adhesion and ductility, though much less than clay. When dry, it is more or less friable, like chalk. A mixture of sand, or broken earthen vessels, greatly increases its firmness, which it seems to effect by rendering it more difficult for the parts to be removed with respect to each other. When mortar is left to dry by the gradual evaporation of its superfluous water, it is very long before it obtains its utmost degree of firmness. But if dry quicklime be mixed with mortar, it gradually absorbs the superfluous water, and the mass becomes solid in a very short time.

The best lime for agricultural purposes is that which is lightest, whitest, softest to the touch; the purest and strongest lime is always found the lightest. If, then, by calcination, limestone loses much of its weight by this process; if the lime shells are extremely light, and require for slaking them fully, a large portion of water; if they are a considerable time before they begin to fall; if during the process of burning, the limestone is not disposed to run or become vitrified; if it increases very much in bulk by slaking, and the lime is a pure white, and fine and light to the touch, it may be set down as very good, and should be used in preference to other lime not possessing the same qualities. The use of lime is increasing in agriculture, and is found by those who understand the nature and design of it, to be attended with the best results. Where it has failed, the loss has arisen from want in its application, and not from any want of fertilizing capability in the article itself.

LINEN. In Commerce. The linen manufacture was probably introduced into Britain with the first settlements of the Romans. The flax was certainly first planted by that nation in the British soil. The plant itself indeed appears to have been originally a native of the east. The woollen drapery would naturally be prior in its origin to the linen, and the fibrous plants from which the threads of the latter are produced, seem to have been first noticed and worked by the inhabitants of Egypt. In Egypt, indeed, the linen manufacture appears to have been very early; for even in Joseph's time, it had risen to a considerable height. From the Egyptians the knowledge of it proceeded probably to the Greeks, and from them to the Romans.

LINIMENT. An oily or spirituous preparation for external use, of a consistence not so thick as an ointment. There are various useful liniments employed in medicine; the volatile liniment, of various strength, made of ammonia and oil, and applied very beneficially in sore throats and other cases, where an external stimulus is required; and the carron oil, a liniment of great efficacy in burns and scalds, made of olive oil and lime-water, equal parts. The tincture of soap, alone or with opium, is called anodyne liniment or opodeldoc, and is used to rub parts of the body affected with rheumatic or other pains. Stimulant liniments are useful in chronic diseases of the viscera, both by their own powers exciting the skin to action, and by relieving the internal parts; and also by the friction itself.

LINSEED. This is the seed of the common flax, and is one of the most valuable seeds cultivated for oil. The process of growing, pulling, rotting, and dressing, is familiar to most farmers, though such is the value of the lint, or flax, and the seed, that we think the culture might be profitably extended. For common painting, the linseed oil is the best that can be procured, and it forms the base of all varnishes into which oil enters as a part. After the oil is expressed from the seeds, the residue, called oil cake, is one of the most nutritive substances used, and is justly celebrated for fattening animals. When cattle are to be fed on oil cake, they are usually put up at the end of the grass season. The cake, broken or ground fine in mills, is fed to them at the rate of about four quarts a day each, one-half in the morning and the other at night. With the oil cake, is also fed cut hay or straw, cob meal, or inferior grain or other matters; and the result is they fatten very rapidly. A small quantity of oil cake fed to horses, during winter, gives their coat a fine sleek appearance, as well as improves their condition. Oil cake is sometimes fed to milk cows, but while it increases the milk, it has the effect of giving it a somewhat unpleasant taste.

LION. The lion, like all other cats, is armed, in each jaw, with six strong and exceedingly sharp cutting teeth, two formidable canine, and six others, occupying the usual place of the molars, but differing from these by terminating in sharp protuberances. Besides these, there is a small tooth, or tubercle, on each side of the upper jaw, immediately posterior to all the others. The tongue is covered with rough and elevated papillæ, with their points directed backwards. The claws, which are five in number on the fore feet, and four on the hinder, are of great length, extremely powerful, and much curved; like those of the other cats, they are retractile within a sheath enclosed in the skin covering the paws. The lion is distinguished from his kindred species by the uniformity of his color, which is pale tawny above, becoming somewhat lighter beneath, and never, except while very young, exhibiting any markings; and also by the long and flow.

ing mane of the old male, which, covering the whole head, extends backwards over his shoulders.

The roar of the lion is terrific and loud, especially when heard in the solitary wilds he inhabits. This roar is his natural voice; for when enraged, he utters a short and suddenly repeated cry, while the roar is a prolonged effort, a kind of deep-toned grumbling, mixed with a sharp, vibrating noise. It has been usually stated, that the lion had constant and stated times for roaring, especially when in captivity; but this has been shown to be erroneous in some degree. It appears, however, that, in summer time, and especially before atmospheric changes, he uniformly commences about dawn; at no other time is there any regularity in his roar. When enraged, his cry is still more appalling than his roar; he then beats his sides with his tail, agitates his mane, moves the skin of his face and his shaggy eyebrows, thrusts out his tongue, and protrudes his dreadful claws. The lion requires about sixteen pounds of raw flesh a day; he drinks often, lapping like a dog; but in this process his tongue is bent downward; his breath is very offensive, and the odor of his urine insupportable.

LIQUID. Fluids have been divided in two classes, viz: those which are elastic, and the non-elastic, or those which do not sensibly diminish in bulk when subjected to pressure. The first class are airs or gases, the second liquids; hence, we may define a liquid to be a fluid not sensibly elastic, the parts of which yield to the smallest impression, and move on each other. When liquid bodies are mixed together, they act in various ways according to the nature of the substances employed. Some dissolve each other in any proportion, as is the case with most gases when mixed; some unite in determinate proportions; some do not act sensibly upon each other, separating again, though mixed ever so carefully; and some decompose each other.

LIQUORICE. It is an excellent medicine in coughs, and all disorders of the breast and lungs. The only simple preparation of it in use, is its inspissated juice, commonly known by the name of Spanish juice of liquorice, as being brought originally from Spain. This has the same virtues as the root itself; and is to be chosen firm, but not tough; hard; and, when broken, of a fine shining surface; such as melts in the mouth without leaving any harsh or gritty particles in the teeth, and does not taste of burning.

LIVING WITHIN THEIR MEANS. It is remarkable, that China, with a well defined nationality of 4,000 years, and a population for 2,000 years denser according to its area, than that of France or Britain, has never had cause to complain of the misery or distress of her people! Virtually, she has no paupers—no poor. Her infirm or unfortunate have been generally provided for by the State; while her masses have been, and are, the happiest and most independent people on earth. The reason of this lies in the habits of industry,

and love of peace of the Chinese. They till the earth in every available spot ; they drain marshes, and earth over waste places ; they turn all the riches of the earth to the most practicable account ; and living peacefully and simply, they have comfort and plenty. No people on earth live so completely within their own means. They have never sought the trade of any country, never have interfered with any other country ; but, minding their own business, have grown rich and been wise, when more boasting nations were steeped in poverty and ignorance. Surely the nations and people of Europe and the Western Hemisphere, have yet to learn the art of true living and well governing.

LOADSTONE. A sort of ore dug out of iron mines, on which the needle of the mariner's compass is touched, to give it a direction north or south. It is a peculiarly rich ore of iron, found in large masses in England, and most other places where there are mines of that metal. It is of a deep iron gray, and when fresh broken, it is often tinged with a brownish or reddish color.

LOCOMOTION. The chief obstacles which oppose locomotion, or change of place, are gravity and friction, the last of which is, in most cases, a consequence of the first. Gravity confines all terrestrial bodies against the surface of the earth, with a force proportionate to the quantity of matter which compose them. Most kinds of mechanism, both natural and artificial, which assist locomotion, are arrangements for obviating the effects of gravity and friction. Animals that walk, obviate friction by substituting points of their bodies instead of large surfaces, and upon these points they turn, as upon centres, for the length of each step, raising themselves wholly or partly from the ground in successive arcs, instead of drawing themselves along the surface. As the feet move in separate lines, the body has also a lateral, vibratory motion. A man, in walking, puts down one foot before the other is raised, but not in running. Quadrupeds, in walking, have three feet upon the ground for most of the time ; in trotting only two.

For moving weights over the common ground, with its ordinary asperities and inequalities of substance and structure, no piece of inert mechanism is so favorably adapted as the wheel carriage. It was introduced into use in very early ages. Wheels diminish friction, and also surmount obstacles, or inequalities of the road, with more advantage than bodies of any other form, in their place, could do. The friction is diminished by transferring it from the surface of the ground to the centre of the wheel, or, rather, to the place of contact between the axle-tree and the box of the wheel ; so that it is lessened by the mechanical advantage of the lever, in the proportion which the diameter of the axle-tree bears to the diameter of the wheel. The rubbing surfaces, also, being kept polished and smeared with some unctuous substance, are in the best possible condition to resist friction.

In like manner, the common obstacles that present themselves in the public roads, are surmounted by a wheel with peculiar facility. As soon as the wheel strikes against a stone or similar hard body, it is converted into a lever for lifting the load over the resisting object. If an obstacle eight or ten inches in height were presented to the body of a carriage unprovided with wheels, it would stop its progress, or subject it to such violence as would endanger its safety. But by the action of a wheel, the load is lifted, and its centre of gravity passes over in the direction of an easy arc, the obstacle furnishing the fulcrum on which the lever acts. Rollers placed under a heavy body diminish the friction in a greater degree than wheels, provided they are true spheres or cylinders, without any axis on which they are constrained to move; but a cylindrical roller occasions friction, whenever its path deviates in the least from a straight line.

The mechanical advantages of a wheel are proportionate to its size, and the larger it is, the more effectually does it diminish the ordinary resistances. A large wheel will surmount stones and similar obstacles better than a small one, since the arm of the lever on which the force acts is longer, and the curve described by the centre of the load is the arc of a larger circle, and of course, the ascent is more gradual and easy. In passing over holes, ruts or excavations, also, a large wheel sinks less than a small one, and consequently occasions less jolting and expenditure of power. The wear also of large wheels is less than that of small ones, for if we suppose a wheel to be three feet in diameter, it will turn round twice, while one of six feet in diameter turns round once; so that its tire will come twice as often in contact with the ground, and its spokes will twice as often have to support the weight of the load. In practice, however, it is found necessary to confine the size of wheels within certain limits, partly because the materials used would make wheels of great size heavy and cumbersome, since the separate parts would necessarily be of large proportions to have the requisite strength, and partly because they would be disproportioned to the size of the animals employed in draught, and compel them to pull obliquely downwards, and therefore to expend a part of their force in acting against the ground.

LOCUSTS. Of all animals capable of adding to the calamities of mankind, by destroying the vegetable products of the earth, the migratory locusts would seem to possess the most formidable powers of destruction. In Syria, Egypt, and almost all the south of Asia, these insects make their appearance in legions, and carry desolation with them, in a few hours changing the most fertile provinces into barren deserts, and darkening the air by their numbers. Happily for mankind, this calamity is not frequently repeated, for it is the inevitable precursor of famine, and its horrible consequences. The annals of the most southern Asiatic climates are filled with accounts of the devastations produced by locusts. They seldom visit Europe in such

swarms, though they are there occasionally formidable to the agriculturist. We are told that nearly as much damage is done by their touch as by what they devour. Their bite is thought to contaminate the plants, and either to destroy or greatly weaken their vegetation. Barrow states that in Southern Africa, the whole surface of the ground might some years literally be said to be covered with them for an area of two thousand square miles.

The most remarkable species of this insect is the seventeen years locust, so common, in particular seasons, in some parts of the United States. They emerge from the ground towards the end of April, and always during the night. On their first coming out, they are in the pupa state; but the back soon bursts, and the perfect fly appears. They begin to lay eggs about the end of May; these are deposited in close lines of two inches long, in the tender twigs of trees. As soon as the young attain their growth, in the grub state, they fall to the ground, and make their way two or three feet underneath the surface, in order to undergo their change into the pupa form. Soon after attaining their last transformation, they are found in great numbers over large districts of country. They appear about every seventeen years, though it is highly probable, that the periods of their return vary according to the heat of the climate, and other circumstances. These insects have been known to make their appearance in the city of Philadelphia in great numbers, penetrating from their subterranean residence between the bricks of a pavement.

LOCUST-TREE. This valuable and ornamental tree, which is so frequently cultivated in the Atlantic States, and which is highly prized in Europe, grows wild in great profusion among the Alleghany Mountains, and throughout the Western States, even to the borders of the sandy plains which skirt the base of the Rocky Mountains. When in bloom, the large, pendulous recesses of fragrant white flowers, contrasting with the light green foliage, produce a fine effect, and give this tree a rank among the most ornamental. The flowers, resembling in form those of the pea, diffuse a delicious perfume, and are succeeded by a flat pod. The branches and young stems are usually armed with thorns. The wood is compact, hard, capable of receiving a fine polish, and has the valuable property of resisting decay longer than almost any other. The color is greenish yellow, with brown streaks. Locust posts are consumed in enormous quantities, and everywhere preferred where they can be obtained. It is also used in ship-building.

LOG WOOD. Logwood is used in great quantities for dyeing purple, and more especially black. All the colors, however, which can be prepared from it, are of a fading nature, and cannot, by any art, be made equally durable with those prepared from some other materials. Of all the colors prepared from logwood, the black is the most durable. Dr. Lewis recommends it as an ingredient in making

ink. Logwood is also found to have a considerable astringent virtue as a medicine, and an extract of it is sometimes given with great success in diarrhœas.

LUCERNE. This is one of the most common cultivated grasses in the south of France, Spain, Italy, and on the shores of the Mediterranean Sea generally, and has been a favorite from the earliest ages. It grows when cultivated some two or three feet high, is perennial, and flowers in June or July. Lucerne requires a deep and light soil, with a free or porous sub-soil, and in good condition from cultivation. It will not grow on all soils, like some of the clovers, and on a heavy compact soil is sure to prove a failure. Lucerne is to be cultivated much as the clovers, which it greatly resembles in product and quality, except that when sown in drills, and hoed, as it sometimes is, it may be kept in the ground a long time with increasing productiveness. If sown broadcast, and left to take its chance, it is apt to be soon crowded out by the grasses and hardier plants. It should be sown in the spring, and from ten to sixteen pounds per acre may be used. It does not arrive at its full growth and productiveness until the third year, but it may be mown or cut from the first year. There is no plant so well adapted to the soiling of animals, particularly the horse, as it is early, grows rapidly, and is eminently wholesome and nutritive. Perhaps there is no better feed for milk cows than lucerne. When attempted in this country on the right soil and in a proper manner, it has succeeded very well, but fears are entertained that in the Northern States it will not be found as hardy as clover.

LUNGS. The organs of respiration, situated in the cavity of the chest. They are divided into lobes, of which the right side contains three, and the left only two, in order to allow room for the heart and great vessels. All the blood of the body passes through the lungs, in order to be there exposed to the influence of the external air, by which it undergoes a change necessary to make it salutary for the body, which it is not, after once having circulated through it. The blood circulates through the lungs always contained in vessels, and it is believed to be exposed to the action of the air not directly, but through the medium of thin vesicles, as the windpipe is continued by branches continually getting smaller and smaller, till at last they end in points too minute for sight.

An organ of such importance as the lungs, so close to the moving centre of action, so abundantly supplied with blood, and so delicate in their own ultimate structure, may be easily supposed to be liable to very numerous diseases, and those of the most dangerous kind. Accordingly, a very large proportion of fatal diseases are those which occur in the chest, either in the substances of the lungs themselves, in the membranes that line them, or in the numerous vessels that ramify through them. Pleurisy, asthma, catarrh, consumption, spitting of blood, are some of the dangerous or painful diseases of the

lungs; but the question often asked by non-medical persons with so much anxiety, about themselves or friends, whether the lungs are affected, seems to have reference principally to the symptoms of consumption.

LYMPH. A fine fluid, separated in the body from the mass of blood, and contained in peculiar vessels. It is distinguished into watery and coagulable lymph; the former, as tears, for an example, is little else than water holding in solution a small portion of salt, and still less of animal matter. Coagulable lymph, which is found in the dropsy, contains a very considerable portion of albumen, so as to be viscid to the touch, and when heated to coagulate firmly, like the white of an egg.



THE LYNX.

LYNX. The Canada lynx, or grey wild cat, when full grown, measures a little over three feet from the point of the nose to the root of the tail, and the length of the tail is about six inches more. The weight will vary from fifteen to twenty-five pounds. Its food consists of several species of grouse and other birds, the northern hare, grey rabbit, chipping squirrel, and other small quadrupeds, occasionally attacking and devouring deer, sheep, lambs, poultry, and pigs. It is said, also, that it will pounce upon the wild goose, at its breeding-places, and will destroy the wild turkey while on her nest. When alarmed or pursued, it leaps rapidly in a straight line from danger, and if hard pressed, will take to a tree. It will not ordinarily attack a man, but on becoming desperate from hunger or fear, it will attack

him with great ferocity. It breeds but once a year, usually producing two young at a birth. It exists in Labrador, the Canadas, and rarely in the northern parts of New England.

LYMPHATIC VESSELS. A set of vessels in the animal body, numerous and important, which open into the cellular texture and into the various cavities, and absorb the lymph and other watery fluids, convey them through glands situated in different parts of the body, till they pour the fluid into the thoracic duct, the same to which the lacteals convey the chyle; and from which the two fluids are carried into the lungs, there to be completely fitted for the purposes of the body. When the lymphatic glands are diseased or any way obstructed, they give rise to hard knotty swellings in various parts of the body; and they are thought to be peculiarly the seat of scrofulous inflammation. Such swelled glands are often seen in the neck and groin. The best way to promote the healthy action of the lymphatic vessels and glands, is to wear warm clothing, to use moderate and constant exercise, to pay attention to diet, and to the regular action of the bowels.

MACHINE. Any complication of artificial bodies acting upon one another by contact, through the medium and motion of which any effect is produced, is a machine. The initial force which puts the machine in motion, is called the first or prime mover. The point at which that force is applied, is the acting point; and that in which the effect is produced is the working point: the machine being the medium through which the power is transferred, and by which it is modified so as to answer the intended purpose. When a simple body is the medium between the acting and the working points, it is an instrument.

MADDER. Madder is a plant, with rough narrow leaves, set in form of a star, at the joints of the stalk. The root, which is the only part made use of, is long, slender, of a red color, both on the outside and within, excepting a whitish pith, which runs along the middle. For cultivating this plant, the ground is ploughed deep in autumn, and again in March; and then laid up in ridges, eighteen inches asunder, and about a foot high. About the beginning of April, they open the ground where old roots are planted, and take off all the side shoots, which extend themselves horizontally; these they transplant immediately upon the new ridges, at about a foot distance, where they remain two seasons. It is to be observed, that this method of planting in ridges is only necessary in wet land, and that the rows are sometimes planted three feet, and the plants in the rows eighteen inches asunder. If all the horizontal roots are destroyed from time to time, it will cause the large, downright roots, to be much bigger, in which the goodness of this commodity chiefly consists. Madder gives out its color, both to water and rectified spirit; the watery tincture is of a dark dull red; the spirituous of a deep bright one. It imparts to

woolen cloth, prepared with alum and tartar, a very durable, though not a very beautiful red dye. As it is the cheapest of all the red drugs, that give a durable color, it is the principal one commonly made use of for ordinary stuffs. Sometimes its dye is heightened by the addition of Brazil wood, and sometimes it is employed in conjunction with the dearer reds, as cochineal, for demi-scarlets, and demi-crimsons.

Madder is principally cultivated in Holland, the province of Zealand being almost entirely covered with it, whence it is exported to every part of Europe and America, yielding almost incalculable profits. The imports of this article, for the use of our manufactures, is stated to amount in value to more than two millions of dollars annually. Our soil and climate are found to be well adapted to its culture, and some successful experiments have been made in raising it in western New York and Ohio, and perhaps elsewhere. The profits on these experiments justify the conclusion, that when our farmers become better skilled in its culture, it may be made one of the most advantageous branches of agricultural industry. In one of the experiments alluded to, the net profit was above two hundred dollars per acre. Madder requires a deep rich sand loam, moist, but not wet.

MADEIRA. A wine brought from the island of that name. It is more stimulant than port; it agrees well with the stomach, and is excellently adapted for debilitated constitutions, and for rousing the nervous energy in the weakness of typhoid diseases. But good Madeira wine is difficult to be procured; it is no longer made of the same excellence as formerly; and the trade, according to Mr. Brande, overflows with a variety of inferior and mixed wines, of all prices and denominations, to which the name of Madeira is most undeservingly applied. In its purest form, Madeira generally is more acid than either port or sherry, and is consequently not so well adapted to stomachs inclined to acidity, where it is generally found peculiarly heating and irritating.

MADNESS. This is one of the most formidable and dangerous diseases to which animals are liable. It usually originates in some domestic animal, as a disease, commonly in the dog, and the infection is communicated to others by biting, or by allowing the saliva or froth of the mad animal to fall upon, or be injected into a wound on the bodies of others. The saliva of an ox or a man, laboring under the hydrophobia, is as dangerous and fatal as that of the dog that originated the disease. Instant and complete incision, or cutting out the wounded parts, is probably the most certain preventive of the disease; yet, unfortunately, there is no effectual remedy for it. When an animal has been bitten, he must be carefully examined to ascertain all the wounded parts, as the smallest scratch may be fatal, and cutting or burning—sometimes done—one part, will be of little avail, if others are overlooked. Animals rarely show that dread of water, when mad, that

characterizes the disease in man ; and they will frequently drink freely till the last. Among animals, there are two kinds of the disease ; the dumb madness and the excited or raving madness. In the first, the animal is frequently harmless through the whole of the disease ; in the second he is most ferocious, and seems eager to destroy whatever comes in his way. But in all cases, no chance for mischief should be allowed, as the disease at all times seems suddenly to change, and the dog or the bull will inflict the most terrible injuries. Singular as it may seem, the milk, or even the flesh of animals suffering from madness, may be used without the least danger. The poison is no where evolved except in the saliva, and however unpleasant it might be to the imagination to feed on the milk or flesh of a rabid animal, no fatal, or indeed, injurious results, need be apprehended.

MAGPIE. This crafty and well known bird is found in both continents, though it is much more limited in its range in America, being confined to the northern and western regions. In its habits and manners, it much resembles its brethren the crows ; like them, it indiscriminately feeds on both animal and vegetable food ; it is peculiarly destructive to the eggs and young of the feeblar tribes of birds. It is about eighteen inches in length, and weighs from eight to nine ounces. It has a black bill, wings and tail ; but the latter are variegated with white, green, purple, and blue, of different shades.

The construction of the nests of these birds shows great art, they having a thorny cover, and the entrance being at the side. The female lays from five to seven pale-greenish eggs, closely spotted with black. When taken young, they readily become domesticated, and learn to repeat many words, and even sentences, as well as to imitate every noise within hearing. This faculty appears to have been known to the ancients, as Plutarch relates an account of the performances of one of these birds, belonging to a barber in Rome.

MAGNESIA. A species of earth, of great benefit in correcting acidity of the stomach. It is of the class of what are called alkaline earths ; and having an affinity for acids, it attracts to itself whatever acid it finds in the stomach, and forming with it a purgative salt, it produces several easy motions of the bowels, and so removes the acidity, heartburn, and other unpleasant symptoms. Magnesia may be taken to the extent of a tea-spoonful twice or thrice a day, according to the urgency of the symptoms ; and it may be mixed with water, or peppermint water, or any similar fluid, to diminish its insipidity. Magnesia may be safely and usefully given to children, even when very young, mixed with thin gruel. The best magnesia is what is called burnt or calcined magnesia. Magnesia is either found in nature, combined with the carbonic acid, or it is obtained in that combination in the process of preparing it from Epsom salts, which are magnesia combined with sulphuric acid. This carbonate of magnesia answers the purpose of correcting acidity, and is cheaper, but in some

eases may be disadvantageous, on account of their being an escape of carbonic acid, which gives rise to flatulency in the stomach and bowels. By exposing the carbonate of magnesia to a strong heat for a proper length of time, the carbonic acid is driven off, and the pure magnesia remains, which is then termed pure, calcined or burnt magnesia. Double the quantity of the carbonate is required to produce the same effect as the calcined magnesia.

MAGNETIC NEEDLE. A small bar of iron, to which, by artificial means, the peculiar arrangement of the magnet has been transferred, by which it points in the magnetic meridian; and the direction of this meridian being known, the course of ships at sea is thereby determined. It also dips or inclines from the plane of the horizon, pointing towards the apparent centre of a magnetic sphere, existing, as it were, with the sphere of the earth, the varying poles of which seem to be at right angles to the plane of the ecliptic.

MAHOGANY. The mahogany tree is a native of the warmest parts of America, and grows also in the islands of Cuba, Jamaica, Hispaniola, and the Bahama islands. It abounded in the low lands of Jamaica formerly, but it is now found only on hills, and places difficult of access. This tree grows tall and straight, rising often sixty feet from the spur to the limbs; and is about four feet in diameter. The foliage is a beautiful deep green, and the appearance made by the whole tree very elegant. The flowers are of a reddish or saffron color, and the fruit of an oval form, about the size of a turkey's egg. Some of them have reached to a monstrous size, exceeding one hundred feet in height. In felling these trees, the most beautiful part is commonly left behind. The negro workmen raise a scaffolding of four or five feet elevation from the ground, and hack up the trunk, which they cut into balks. The part below, extending to the root, is not only of larger diameter, but of a closer texture than the other parts, most elegantly diversified with shades or clouds, or dotted like ermine with spots: it takes the highest polish, with a singular lustre. This part is only to be come at by digging below the spur, to the depth of two or three feet, and cutting it through; which is so laborious an operation, that few attempt it, except they are curious in the choice of their wood, or to serve a particular purpose.

The mahogany tree thrives in most soils, but varies in texture and grain, according to the nature of the soil. On rocks, it is of a smaller size; but very hard and weighty, and of a close grain, and beautifully shaded; while the produce of the low and richer lands is observed to be more light and porous, of a paler color, and open grain; and that of mixed soils to hold a medium between both. This constitutes the difference between the Jamaica wood and that which is collected from the coast of Cuba and the Spanish Main: the former is mostly found on rocky eminences; the latter is cut in swampy soils, near the sea coast. The superior value of the Jamaica wood, for

beauty of coloring, firmness, and durability, may therefore be easily accounted for ; and a large quantity of balks and planks is brought from the Spanish American coasts to Jamaica, to be shipped from thence to Great Britain. This wood is generally hard, takes a fine polish, and is found to answer better than any other sort. in all kinds of cabinet ware. It is a very strong timber, and was frequently used as such in Jamaica in former times. It is said to be used sometimes in ship building ; a purpose for which it would be remarkably adapted, if not too costly ; being very durable, capable of resisting gun shots, and burying the shots without splintering.

MALT LIQUORS. Malt liquors contain a considerable portion of nutritive matter, and a less proportion of spirit than wine ; and they also contain a bitter principle derived from the hop, with some soporific properties. Those who use much malt liquor generally grow fat. They have the muscular strength increased, and the general health for a time improved ; but if carried to excess, and if proper exercise be not taken, a fulness of the system is induced, and it is rendered liable to all the diseases which such a state brings on. As very concentrated nourishment will not be well digested, because the stomach requires a certain bulk as well as quality of food, in order to the production of good chyme, malt liquors agree best with those in the poorer walks of life, whose food, though bulky, is not very nutritive, but whose stomachs are enabled by the stimulus of the hop to extract a good deal of nourishment from what they eat. Malt liquors are infinitely preferable to spirits for the laboring classes ; but those who live well, and indulge in a variety of dishes, have no need of the stronger kinds of malt liquors ; though table beer would assist their digestion very considerably. The principal kinds of malt liquor in use are, beer, ale, and porter.

MAMMEE TREE. Mammee tree, or West India Apricot ; a large and beautiful tree, native of tropical America, and interesting from the qualities of the fruit, which is highly esteemed. This fruit is large, roundish, and contains a bright yellow, firm pulp, which is enveloped with a thick, leathery rind : within this outer rind is a second very delicate one, closely adhering to the pulp, which should be cautiously removed, otherwise it leaves a bitter taste in the mouth, not very strong at first, but gradually increasing, and continuing for two or three days. The taste is peculiar, sweet, and very agreeable, and is accompanied with an aromatic and pleasant odor. The leaves are oval, obtuse, very entire, smooth, and six or eight inches in length. The flowers are white, an inch and a half in diameter, and diffuse a delightful perfume.

MANCHINEEL. A West Indian tree, celebrated for the poisonous qualities of the milky juice which abounds in every part of it. When a drop of this juice is applied to the skin, it causes the same sensation as a burning coal, and quickly produces a vesicle. The

Indians use it for poisoning the points of their arrows, which preserve their venom for a long time. The workmen employed in felling these trees first build a fire round the trunks, in order to make the juice evaporate, and cover their eyes with gauze ; but, notwithstanding these precautions, they are subject to be incommoded with the dust. The accounts, however, which represent it as dangerous to sleep in the shade, or to come in contact with the rain which has fallen upon this tree, are highly exaggerated. The inhabitants of Martinique formerly burnt entire forests of the manchineel, in order to free their dwellings from its presence.

MANGEL WURZEL. Mangel Wurzel, or the root of scarcity, is a root much celebrated as food for cattle. It is a species of beta. It is a biennial plant ; the root is large and fleshy, sometimes a foot in diameter. It rises above the ground several inches, and is thickest at the top, tapering gradually downwards. The color of the roots vary ; being white, yellow, and red. It is good fodder for cows, and for rabbits, and produces great plenty of leaves, which are very palatable and wholesome for cattle. It is chiefly cultivated in Germany.

MANURES. All agents used by agriculturists to preserve or restore the productiveness of the soil, are properly called manures. All soils, after being cultivated and subjected to the exhausting influence of continual harvests, become deficient in mineral and organic elements, which must be replaced artificially, or total barrenness will ensue. Manuring is the process by which this end is accomplished, and for it there is no substitute. If the supply be less than the crops require, the soil increases in barrenness ; if it just replaces what has been removed by the crops, the fertility remains the same ; if more be added than the crops require, the fertility of the land is increased.

The whole science of manuring consists in supplying to the soil those indispensable elements which have become exhausted. The richest manure may be applied to a failing soil, and if it lacks a particular element which the crops require, and which the soil does not contain, the soil grows barren, notwithstanding the manuring. Farm-yard manure probably contains the greatest number of elements necessary to fertility ; but particular plants require special manures. The remains of plants, together with the excrements and carcasses of animals, if returned to the soil before decomposition, must contain all the mineral, organic, and gaseous elements, which the plants derived from the soil or the atmosphere. These must pass through the different processes of decomposition, before they assume their original gaseous and earthy forms, and become available for the food of plants.

Manures operate beneficially on the soil in several ways. First, by serving directly in some instances as the food of plants. Second, by causing chemical changes in the soil, by which other substances are prepared to be taken up as nutriment by their roots. Third, by

neutralizing noxious substances in the soil, which prevent the growth of vegetation. The operation of lime on a cold, sour, peat soil, or one which abounds in sulphate of iron, is an example of this principle. Fourth, manures change, according to their bulk and texture, the mechanical properties of soils. Fifth, manures may change more or less, according to their various properties, the chemical character of a soil, in relation to its light, heat, air, and water. Sand, used upon a clay soil, for the purpose of rendering it more loose and friable, would be as properly a manure as farm-yard or any other variety. Clay used to ameliorate a sandy soil, is also in effect a manure. Manures have been classified in various ways, according to their supposed operation and nature. The most simple and convenient division, and one which is usually adopted at present, is that which arranges all of them into three classes—animal, vegetable, and mineral manures. The first class includes all substances of animal origin; the second includes all those of vegetable origin; and the third, all those directly from the mineral kingdom.

The success of a farmer depends mainly on the abundance of his manures, and the skill with which he preserves and applies them. Most farmers, with a little extra effort, might double and even quadruple the amount of their fertilizers. Till turning their attention to the subject few would realize how easily it is done. Every farm abounds with the materials that might be collected for them. Hogs, especially, if supplied with these materials, would make manure enough to pay for all they eat. To do this in the best manner, there should be among farmers a competition, to see who will collect the most; and each one should avail himself of his neighbor's experience. And above all, no one should be without a good Muck Book; that of Browne is the best.

MAPLE SUGAR. The manufacture of maple sugar has been, and still may be an important business in several of our northern States. Should proper attention be paid to it, the importance may rise above what it ever has been. There will always be thousands of families who would find it much easier to produce the sugar for their own use than to buy it. In the early settlements of the country the process was very simple. Those who made the least would bring the sap of the maple to their own houses, and there reduce it to sugar. Others who made it in larger quantities, and whose maple forests were at an inconvenient distance for doing that, would construct cheap cabins in the midst of them, in which to shelter themselves during the season of collecting the sap. In front of such cabins they would have suspended in the open air, large kettles constantly filled with the precious liquid. Here by night and by day would be seen the rousing fires beneath the kettles, the flames affording cheerfulness and warmth to those who watched them, and filling the air with their wide spreading illuminations. With the increase of facilities to

reduce the labor of manufacturing maple sugar incident to the progress of the country, these rude and simple fixtures have been superseded ; and, instead of them, will now be found in large maple forests, commodious houses with kettles placed on brick furnaces, where the labor can be done with greater facility and less personal toil and exposure. As little as has generally been thought of this American product, the amount manufactured has some years reached nearly forty millions of pounds. One hundred good trees will produce sap sufficient to make from three to five hundred pounds of sugar. The season for it is in March and April.

MAPLE TREES. There are several species of the maple in this country ; the most important and valuable is the sugar maple. This tree is found in great abundance in the northern portions of the United States and in Canada. The labor of procuring the sap and converting it into sugar is exceedingly onerous, but it is required at that season of the year when the general operations of the farm least demand it. The finest sugar is made from the sap that flows the earliest ; and care should be taken that the sap is always boiled down before the process of fermentation or souring commences. In the latter part of the sugar season, after the buds begin to swell, the conversion of sap into sugar becomes more difficult, and that made is not as fine flavored as that earlier produced. The sap flows from the alburnum or sap wood, and this should not be wounded to the depth of more than an inch or an inch and a half. Some of the other varieties of maple produce those beautiful woods called curled or birdseye maple, and which are so much in demand by cabinet-makers.

It would be difficult to imagine what wiser and better thing can be done by farmers than to transplant the sugar maple. If there were to be an hundred only on each farm, how much value would thereby be given to it. Only a moderate sized piece of land would be wanted for them, and they would yield sap sufficient to supply the family with sugar. And independent of such an use, a number of such trees about our dwellings would be in the highest degree ornamental, and furnishing delightful shades in summer for man and beast. And if each land holder were to plant these trees by the road side opposite his own premises, how much would be added to the beauty of rural scenery ! It would be the admiration of all travellers. Let every man in a township or county do this ; and let there be on every farm an hundred or more of these trees, and no one can tell what may be the advantage of it to posterity. It would be better to the farmer's children than money invested at twelve per cent. In fifteen or twenty years after being transplanted, these little trees, if in the order of an orchard, would make a delightful and magnificent forest ; and if by the road side, and about the neat cottage or the stately mansion, would in their season impart a delicious fragrance to the atmosphere, conducing to the health and the pleasure of all inhaling it. We

would like to see Agricultural Societies encourage the growth of the sugar maple. Let them give premiums for its culture.

MARBLE. This is the popular name of any species of calcareous stone or mineral, of a compact texture, and of a beautiful appearance, and susceptible of a good polish. The varieties are numerous and greatly diversified in color, as well as in the fineness of their structure. Some of it is white, some of it black, and some variegated with every possible shade and delicate blending and combining of different hues. Marble is limestone, or a stone which may be calcined to lime, a carbonate of lime; but what is usually denominated limestone is of a coarse and inferior quality. Marble of various degrees of beauty is abundant and found in different parts of the country.

MARE. Some difference of opinion exists among farmers as to the comparative value of mares or geldings for labor; but it is thought when everything is taken into consideration, the former will be deemed the most profitable. Mares are as lasting and durable as geldings, do not usually cost as much, and should any accident render them permanently lame, or unfit for labor, or even if remaining sound, they can be used for breeding. There is no necessity for the mare lying idle when with foal. Moderate labor, even to the period of foaling, will be better for her and for the foal, as she will be in more vigorous health than if idle. It is a singular fact, that the Arabs, noted for the beauty and value of their horses, use none but mares. These they find more hardy, capable of longer endurance over the deserts, than geldings, and prize and retain them accordingly. Mr. Youatt lays down as a rule, and it is one we are confident every breeder of horses who understands his business will concede is correct, "that the value of a foal depends a great deal more on the dam than the sire." Farmers, however, too often forget this fact, and in raising horses, go on the supposition that every mare is a mare, and every colt a colt, whether they are worth raising or not. A little attention to this point would benefit the breeder by adding to his profits, and greatly improve the appearance and actual value of farm horses. In those parts of the country where grass, and hay, and grain, are plenty, and are so far removed from a market, as to make it necessary to consume them on the premises, the breeding of horses is a profitable department of rural economy.

MARL. Any earthy substance in which the proportion of calcareous matter exceeds that of the sand or clay, is styled in the popular language, a *marl*; of this there are four principal varieties: first, clay marl; second, sand marl; third, slate or stony marl; fourth, shell marl; of these, the last is commonly the richest in calcareous matter. All these kinds of marls are to be found in many of the States of our Union, and are variously valued, owing to the peculiar requirements of adjacent soils. Clay marls are particularly useful to sandy soils, and if spread on the surface of sods, remaining for winter's frosts to

render them pulverulent, the marl not only improves the growth of grass from its action as a mulch, but by slow solution, both its aluminous and calcareous portions are carried into the soil, rendering the soil more retentive of manures and less liable to suffer from the effects of drought. Sand marl is also useful for clay soils, and to any soil deficient of lime. Slate or magnesian marls are seldom of much value, and should only be used in localities where better marls or lime cannot be procured. Shell marls are of various qualities, some of them containing both sulphate and phosphate of lime, and therefore are of great value. This kind of marl forms in part the subsoil of a small portion of land near Jersey City, and on which cabbages have been grown every year for half a century.

Marl, like lime, strictly speaking, is not a manure. When added to the soil, it acts as an ameliorator in improving its texture and modifying its natural condition, rather than by giving materials for the growth of vegetation. Its action upon the soil, and the benefits derived from its application, are akin to those of lime, for it is, in fact, but the carbonate of lime reduced to powder, and mixed with earthy matters. It slakes and expands when exposed to the air, and in common with lime, possesses the property of rendering stiff soils friable and easier of cultivation, and of giving more compactness to those too sandy and light. It also promotes the decomposition of vegetable matter, neutralizes acids, and induces the formation of the nitrates requisite to the highest fertility. It gives activity to the inert vegetable matters often present in barren soils, as its successful employment in the renovation of over-cropped and worn-out lands in many districts in this country, particularly along the seaboard and in the South-western States, most abundantly prove.

MASTICATION. This is the action of chewing, or of agitating the solid parts of our food between the teeth, by means of the motion of the jaws, the tongue, and the lips, whereby it is broken into small pieces, impregnated with saliva, and so fitted for deglutition and a more easy digestion.

MASTIFF. This species of dog is peculiar to England. It is nearly of the size of a Newfoundland dog, strong and active, possessing great sagacity, and is commonly employed as a watch dog. The mastiff is said seldom to use violence against intruders, unless resisted, and even then he will sometimes only throw down the person, and hold him for hours, without doing him further injury, till he is relieved. He has a large head, with short pendent ears, and thick lips hanging down on each side. In the reign of James I., a contest was exhibited between three mastiffs and a lion, in which the king of beasts was compelled to seek for safety in flight.

MASTODON, OR MAMMOTH. This animal, which must have been many times larger than the elephant, is now extinct, and all that remains to attest its former existence are the bones, which are

found deeply imbedded in the earth. These bones have been discovered in various parts of the United States, but as yet only one nearly entire skeleton has been obtained. This was dug up near Newburg, in the State of New York, and was placed in the museum at Philadelphia. It is impossible to determine to what race this huge animal belonged, except that its formation and modes of living were analogous to those of the elephant. That he was not of the same species, is probable; that he was nearly allied to the rhinoceros and hippopotamus, is also probable. The bones of prodigiously large animals of the elephant kind, have been found in Siberia, and those of the mastodon have been found in various parts of Europe.

MATERIA MEDICA. Every substance employed in the cure of disease, whether in its natural state, or after having undergone various preparations, belongs to the *Materia Medica*, in the extended acceptation of the words. But in most pharmacopœias, the *Materia Medica* is confined to simples, and to those preparations which are seldom prepared by the apothecary himself, but commonly purchased by him, as articles of commerce, from druggists and others. Systematic authors on this branch of medical knowledge, have bestowed much pains in contriving scientific arrangements of these articles. Some have classed them according to their natural resemblances; others according to their active constituent principles; and others according to their real or supposed virtues. Each of these arrangements has its particular advantages. The first will probably be preferred by the natural historian, the second by the chemist, and the last by the physiologist. But every scientific classification hitherto proposed, is liable to numerous objections. Accordingly, in the pharmacopœias published by the Colleges of Physicians of London, Dublin, and Edinburgh, the articles of the *Materia Medica* are arranged in alphabetical order, and the same plan is now almost universally adopted.

MEAD. An agreeable liquor made of honey and water. There are many receipts for making mead, of which the following is one of the best. Take four gallons of water, and as much honey as will make it bear an egg; add to this the rind of three lemons, boil it, and scum it well as it rises. Then take it off the fire, and add three lemons cut in pieces; pour it into a clean tub or open vessel, and let it work for three days; then scum it well and pour off the clear part into a cask, and let it stand open till it ceases to make a hissing noise; then stop it up close, and in three months' time it will be fine and fit for bottling. If you would give it a finer flavor, take cloves, mace, and nutmeg, of each four drams; beat them small, tie the powder in a piece of cloth, and put it into the cask.

MEADOW. That part of the farm from which, in temperate or northern latitudes, hay is made for the wintering of domestic stock, is usually called meadow. Under the old system of farming, the

meadow was never disturbed by the plough, but for years in succession was reserved for the scythe; consequently when it was possible the meadow was found on low lands, or those naturally wet, and to preserve its fertility, much of the manure of the farm was applied to the surface dressings, to the great detriment of the tillage land and the crops. Under the improved or rotative system of husbandry, every part of the farm is alike subjected to the plough and the scythe, as the meadow changes as often as the wheat or the corn field. To do this, every part of the farm is made capable of growing any of the cultivated crops, by draining, and while the average product of the whole farm is greatly increased, the quantity and quality of the hay made, will be proportionally improved. The grasses best adapted for meadows where a rotation is practiced, are the clovers, timothy, orchard grass, herds grass, and perhaps some of the foreign grasses may be found useful; but at present nothing is known equal to clover and timothy.

In seeding down lands, too little seed is generally used, whether the land is to be meadow or pasture. Heavy seeding makes a closer turf, finer hay, sweeter and better pasture, and by giving more roots restores the exhaustion consequent on cropping, much sooner. In seeding lands they should always be thoroughly rotted. It will assist the covering and germination of the seeds, and render the surface level and smooth for the scythe. Lands intended for mowing should not be trodden or poached by the feet of cattle in spring, as such poaching renders the surface uneven, destroys the roots of plants, and is of little service to animals. Where, however, it is inconvenient to subject meadow land to the plough, and the grasses and the product decline, such meadows may be restored by occasionally giving them a liberal dressing of compost manure, sowing them afresh with a portion of the most valuable grasses, and giving them a very heavy harrowing in all directions. This will dislodge the masses that clog the surface in old meadows, loosen the surface and promote atmospheric action, and give a new and more vigorous growth of grass plants.

MEALS. The quantity of food taken at regular intervals is commonly understood by the term meal. One of the most important circumstances about meals is their regularity, both as to number, and the periods at which they are taken. Habit has such an influence on the appetite of hunger, as well as on many other of our sensations, that it will return at the stated hour of eating; and if it be not appeased, the stomach will cease its cravings, though no aliment has been supplied. But hunger will in many persons recur before the time usually allotted for the regular meal; and it will often be necessary to take some food, to enable the stomach to hold out till its accustomed period. In a healthy person, whose digestion is good, who has taken sufficient exercise, and who in a morning has taken no very substantial or copious repast, the luncheon will probably be a

matter of indispensable necessity ; but many of those who take luncheon find it to spoil the digestion both of itself and of their dinner ; much more will this be felt by the dyspeptic patient, who needs his stomach to be undisturbed during the digestion of his regular meals, and who should not exhaust his powers by calling them too frequently into action. If additional food be taken before the former portions are assimilated, the process will be disturbed ; and however plausible may be the maxim, that the stomach will be best managed and the strength improved, by taking small quantities of food very frequently, yet this is not found to be true ; in fact, the invalid thrives much better by regular meals at proper intervals, than by that constant throwing in of supply as fast as a morbid craving calls for it, or as a false theory says it should be swallowed.

The number of meals to be taken cannot be subjected to any constant rule. Most people take three in the day ; one copious and substantial, the others more sparing, and with a larger proportion of fluid. Some hardly consider tea as a meal, and some dispense altogether with supper. Those who dine plentifully, and dine late, that is to say, any time after five, may well dispense with supper ; but those who dine before three, will find it for their comfort to take a light supper before going to bed. The quantity of food to be taken at each meal, it is quite impossible to limit by weight or measure. It is a moral duty to stop short at the point where nature is satisfied, as indicated by a certain feeling of satiety that few persons may not be conscious of experiencing at every meal ; and those who are at all in bad health, especially with dyspeptic symptoms, ought to be still more watchful of the coming on of this sensation.

It is proper for those who in general feed to the full, to practice abstinence occasionally, by avoiding solid food, and taking some weak broth. By incessant copious feeding, that state will be induced which is called high health, but from which the transition is easy and probable, to fevers and various other complaints. Convalescents should be very cautious not to urge too hastily their return to strength and vigor. After an acute disease, the person, weak and emaciated, has a good appetite ; but it is dangerous to indulge this, lest he bring his system too rapidly to that state which, relatively to him, is that of high excitement ; and liability to inflammatory diseases. When habits are once formed with respect to the quantity and quality of food, they should not be suddenly altered. Some have no doubt been successful, in rapidly changing from a nutritious and stimulant diet to a spare one ; but it is generally safer to alter the habits by degrees, provided it be really and steadily done. On the other hand, it is equally well known, that those who have been long fasting run the greatest risk of suffering, even fatally, by the sudden use of too much nourishing food.

MECHANICAL POWERS. The mechanical powers are simple

instruments or machines in the hands of man, by which he is enabled to raise great weights, and overcome such resistances as his natural strength could never effect without them. They are six in number, the lever, the pulley, the wheel and axle, the inclined plane, the wedge, and the screw, one or more of which enters into the composition of every machine. In order to understand the power of a machine, four things are to be considered; the power that acts, which consists in the effort of men and horses, of weights, springs, running waters, wind, and steam; the resistance which is to be overcome by the power, which is generally a weight to be moved; the centre of motion, or, as it is termed in mechanics, the fulcrum, which is the point about which all the parts of a body move; and lastly, the respective velocities of the power, and of the resistance, which must depend upon their respective distances from the axis of motion. The power and weight are said to balance each other, or to be in equilibrium, when the effort of the one to produce motion in one direction, is equal to the effort of the other to produce it in the opposite direction. The power of a machine is calculated, when it is in a state of equilibrium, that is, when the power just balances the resistance opposed, and the momentum of each is equal.

MELON. A species of cucumber, indigenous in warm climates, where its juicy fruit is highly acceptable. In cold ones, its coolness is somewhat dangerous. The cantaloupe melon is in principal estimation. To raise melons with a proper regard to wholesomeness and flavor, that water which is usually given, in order to increase their size, should be kept away.

MERCURY. This a mineral or metallic fluid, vulgarly called quicksilver, and distinguished from all other metals by its extreme fusibility, which is such, that it does not assume the solid state, until cooled to the 39th degree below 0 on Fahrenheit's thermometer, and of course is always fluid in temperate climates. It is volatile, and rises in small portions at the common temperature of the air; it readily combines with gold, silver, lead, tin, bismuth, and zinc, and on that account is usefully employed in the silvering of looking-glasses, making barometers and thermometers, and for various other purposes.

MERIDIAN. Meridian is a great circle passing through the poles of the earth, and some given place on its surface. It therefore divides this surface into two hemispheres, the eastern and the western. As the terrestrial meridian is the circle over which the sun is at noon, it is consequently in the plane of the celestial meridian with which the centre of the sun coincides at that time. Now as, by the earth's revolution about its axis from west to east once in twenty-four hours, every part of the equator is successively presented to the sun, all places that are situated eastward or westward of each other have their respective meridians. It is, therefore, always the same hour of the day at all places situated on the same meridian. The first meri

dian of a country is that from which its geographers, navigators, and astronomers, commence their reckoning of longitude; and, the meridians having nothing in themselves to distinguish them from each other, the fixing upon any one for this purpose is quite arbitrary; hence different persons, nations, and ages, have commenced their longitudes at different points, which has introduced no small confusion into geography. But national and even scientific jealousies are too strongly prevalent for us to hope that the world will, at an early period, fix on a common first meridian.

MERINO SHEEP. The variety of sheep known by this name is long in the limbs, but the bone is small; the breast and back are narrow, and the sides are rather flat; the fore shoulders and bosoms are heavy, and the skin under the throat is loose and flabby, or indeed pendulous; the forehead and cheeks are covered with coarse long



MERINO RAM.

hair, but the lower part of the face is smooth and velvety; the head is large, and the forehead rather low. The male carries comparatively large horns, spirally contorted, the curvature often being very graceful. The females are mostly destitute of horns, and where these appendages are present, they are small. The wool of the Merino sheep is exquisitely fine, and admirable for its felting properties. Mr. Youatt gives confirmation to the general testimony in favor of the

article, but also in favor of the large amount annually yielded by each individual sheep. The length and density of the wool furnishes the animal with excellent protection against cold ; and consequently renders it well adapted to the varying latitudes to which it has been removed.

The growing of wool in our country is of the greatest importance to the American farmer. The amount of it wanted for home consumption is incalculable. In all the Northern States, the principal of our clothing is made from it. No country could prosper if obliged to import all that it needed for a population now large and destined to increase to an unlimited extent. It is believed also that wool, with our facilities for producing it, in a commercial view is equally deserving consideration, both with the political economist, and the agriculturist. Hence, with our enterprising citizens, the introduction of Merino has long been an object of attention. If in some cases, as in most new enterprises, there has been manifested a wildness of calculation that eventuated in individual loss, there can be no doubt, that if the pioneers in these efforts have not invariably or generally made themselves rich, they have rendered an excellent service to their countrymen. Another generation will profit from the experience of the present one, so that hereafter fine wool will be one of the great staples of the American States.

METHEGLIN. A species of mead ; one of the most pleasant and general drinks the northern parts of Europe afford, and much used among the ancient inhabitants. There are various methods of making it ; one of the best is the following :—Put as much new honey, naturally running from the comb, into spring water, as that when the honey is thoroughly dissolved, an egg will not sink to the bottom, but be just suspended in it ; boil this liquor for an hour or more, till the egg swim well above the liquor ; when very cool, next morning, it may be barrelled up, adding to each fifteen gallons an ounce of ginger, as much of mace and cloves, and half as much cinnamon, all grossly pounded ; a spoonful of yeast may also be added at the bung-hole to promote the fermentation. When it has done working it may be closely stopped up ; and after it has stood a month it should be drawn off into bottles.

MIGRATION. The migration of birds, as the swallow, quail, stork, crane, field-fare, woodcock, nightingale, and other birds of passage, is a very curious article in natural history, and furnishes a notable instance of the powerful instinct impressed by the Creator. Dr. Derham observes two things remarkable in this subject ; the first, that these untaught, unthinking creatures, should know the proper times for their passage, when to come, and when to go ; as also, that some should come when others go. No doubt the temperature of the air, as to cold and heat, and their natural propensity to breed their young, are the great incentives to those creatures to change their habi-

tations. But why should they at all change their habitation? and why is not some certain place to be found, in all the terraqueous globe, affording them convenient food and habitation all the year round? The second, that they should know what way to steer their course, and whither to go. What instinct is it that moves a poor foolish bird to venture over vast tracts of land and sea. If it be said, that by their high ascents up into the air, they can see across the seas; yet what should teach or persuade them that another land is more proper for the purpose than this? that Britain, for instance, should afford them better accommodation than Egypt? than the Canaries? than Spain? or any other of the intermediate countries?

The manner of the birds of passage journeying to their southern abode may vary, according to the different structure of their bodies, and their power of supporting themselves in the air. Those birds with short wings, though they are incapable of such long flights as the swallow, or of flying with so much celerity, yet may pass to less distant places, and by slower movements. Swallows and cuckoos may perform their passage in a very short time; but there is for them no necessity for speed, since every day's passage affords them an increase of warmth, and a continuance of food. Providence, which has guided the defenceless animals in many other instances to the safest methods of performing their necessary works, may have instructed many of these birds which have shorter passages to make, or places to stop at by the way, to fly only in the night, that they may be secure from the birds of prey; and Mr. Catesby gives a proof that some species do so, from his own observation; for, lying on the deck of a sloop on the north side of Cuba, himself and the whole company heard successively, for three nights, flights of rice birds, which are easily distinguished from all other birds by their notes, and which were passing over their heads northerly; which is their direct way from Cuba, and the southern continent of America, from whence they get to Carolina, annually, about the time that rice begins to ripen, and from whence they return southward again, when it is gathered, and they are become fat.

MILK. The fluid secreted in the breasts of females for the nourishment of their young. That of the cow being furnished in greatest abundance, is of much importance as an article of diet. By boiling milk, its albuminous part is not coagulated into a mass like the white of an egg, on account of the larger quantity of water through which it is diffused; but a thin film rises to the surface, which, if removed, is replaced by another, and if this be continued, the whole of the albumen will be removed. This renders the milk less nutritive, but more easily digestible; and hence many delicate stomachs can take boiled milk, who could not take it in its natural state. As milk is sufficiently nourishing, and holds a just medium between the spare nutriment of vegetables and the stimulant nature of animal food, it is directed with

great benefit to patients laboring under various diseases. One of those in which we find it advisable to direct a milk diet most frequently, is consumption, as nourishment enough is supplied by it to the body without any tendency to increase the inflammatory diathesis, which we so much dread in this disease. When consumption is further advanced, the milk of the ass has been considered not only as nutritive but medicinal; and, in conjunction with other observances, should be directed, when there is the means of procuring it in sufficient quantity.

With respect to milk, considered as the food designed by nature for the early periods of infancy; in general, the milk of most parents agrees well with their offspring, but in some cases, it proves too purgative, or too flatulent, and the child is not properly nourished. In some cases, it may be necessary for the woman to desist from suckling her child, or to make a complete alteration in her diet, manner of living, and place of abode; by which the milk may perhaps become more congenial to the stomach of the child. Human milk is of easy digestion, light, and very nutritious, requiring little labor from the stomach, and easily convertible into chyle. It contains a larger proportion than any other milks, of the fat or buttery part; and having less of the curdy or cheesy part, it is more digestible.

MILL. A combination of machinery to effect purposes which require great force. The force employed is sometimes water, sometimes wind, and at others steam, or horses. The principle is always the same; a main shaft enters the works, to which wheels with cogs are affixed, and the power being the contrary of the velocity, small wheels give great power, and large wheels less power; other wheels are then connected with these in various directions, and the resulting force applied to any desirable object. When corn is to be ground, large stones, cut in grooves, are made to work one against the other in such manner as to break or pulverize the grain. There are also bark mills, paper mills, and oil mills, which operate by the force of percussion; also, silk, cotton, and flax mills, which perform sundry operations; and saw mills, which revolve circular saws with great energy and precision.

MINER'S BEE-HOUSE. The cut connected with this article, is from an original design, and is not so much for general use as for an ornament to flower gardens or lawns of a gentleman keeping bees. The idea of Mr. Miner, to connect with the bee-culture an object of architectural taste and rural beauty, deserves a public acknowledgment, and is worthy the consideration of apiarian amateurs. We scarcely know a branch in rural economy, invested with more absorbing interest than the physiology of the honey-bee; and as much as we have been delighted for years to study its habits, the volume from which this cut is copied, has inspired us with additional desire for increased knowledge on the subject. We know not a more interesting book to

persons having the least taste for the topics on which it treats. Not having had the long experience that he has had in relation to them, nor the leisure to make them subjects of critical investigation, we feel ourselves incompetent to express an opinion upon some of the results to which his inquiries have led him. Of this, however, we can affirm, that no man seemingly is more able to give a well authenticated theory than Mr. Miner. He has labored long in forming his conclusions; his success in the bee-culture has rarely been equalled; and he has even a passion, we should judge, for this department of natural history. We have never tried his hives, represented in the cut, and, of course, cannot speak of them from experience, but we have such confidence in his sufficiency to make improvement in bee-hives, that we should not hesitate to think well of those he has devised, and we can especially recommend, in sincerity, to every person keeping bees, "The American Bee Keeper's Manual," to which we have above alluded.



MINER'S FANCY BEE-HOUSE.

MILLET. The common name of a plant which grows naturally in India, whence it was first imported into Europe. It is greatly cul-

tivated in Italy, Spain, and the southern part of France, for the food of men as well as that of poultry. It may also be raised in this climate. This is a plant that delights in a light sandy soil, prepared in the same manner as for maize; and in such lands it branches out into many stalks, sometimes thirty or forty, not unlike reeds either in their shape or leaves, of which there is one at each joint. The top of each stalk is terminated by a large, loose panicle, which hangs on one side, with a chaffy flower, which is succeeded by a small round seed, about the bigness of a turnip or cabbage seed, of a yellowish white color in one variety, and of a dark red inclining to black in another, which are the small millet, and the large, a distinction which some make, as only varieties of the same species. It is likewise said to thrive extremely well in strong land; but will not do in stony ground, or where the bottom is of either a chalky or clayey nature.

Miller advises, that it should be sown in the beginning of April, that it may ripen in August; but in warmer climates, the general rule is to sow it either between the middle and the end of May, or about midsummer. The former crop is reaped at the end of September, and the latter about the end of October. The seed is usually sown in furrows, very thin, and covered with the plough or rake. The largest sort should be sown thinnest, because it branches most. When the plants are about a month old, the ground should be stirred round them with a hand hoe, as well to lay fresh earth to their roots, as they require much nourishment, as to clear them from weeds, which they afterwards prevent by over-topping them. At the same time, the millet plants should be thinned out wherever they grow too close, so as to leave in general, about six inches between each plant.

MINERAL. In Natural History, is used, in general, for all fossil bodies, whether simple or compound, dug out of a mine. Minerals are inorganized or inanimate bodies, that increase in volume by the juxtaposition of parts, and the force of attraction. The early naturalists divided minerals into a great number of classes; but, by the moderns, they are divided only into three sections. Under the first are arranged earths and stones which have no taste, and do not burn when heated with contact of air; under the second, saline matters, having more or less taste, which melt in water, and do not burn; and under the third, combustible substances, not soluble in water, and exhibiting a flame, more or less evident, when exposed to a fire with access of air.

MIRROR. Mirror is used for any polished body that forms the images of objects, by reflection of the rays of light. Mirrors are either plain, convex, or concave. The first reflect the rays of light in a direction exactly similar to that in which they fall upon them, and therefore represent bodies of their natural magnitude. The convex ones make the rays diverge much more than before reflection, and therefore greatly diminish the images of those objects which they

show ; while the concave ones, by collecting the rays into a focus, not only magnify the objects they show, but will burn very fiercely when exposed to the rays of the sun ; and hence they are commonly known by the name of burning mirrors. In ancient times mirrors were made of some kind of metal ; and from a passage in the Mosaic writings we learn that the mirrors used by the Jewish women were made of brass. The Jews certainly had been taught to use that kind of mirrors by the Egyptians ; whence it is probable that brazen mirrors were the first kind used in the world. Any metal, indeed, when well polished, will reflect very powerfully, but silver reflects the most, though it is too expensive a material for common use. Gold also is very powerful ; and metals, or even wood gilded and polished, will act very powerfully as burning mirrors. Even polished ivory, or straw nicely plaited together, will form mirrors capable of burning, if large. Since the invention of glass, and the application of quicksilver to it, became generally known, it has been universally employed for those plain mirrors used as ornaments to houses ; but in making reflecting telescopes they have been much inferior to metallic ones.

MISLETOE. A plant which always grows on trees, and was thought, therefore, to be an excrescence of the tree ; but it has been found to be propagated by the seed or berry which is conveyed by the mistletoe thrush from one tree to another ; this bird being fond of these seeds, it sometimes happens that the viscous part of the berry sticks to his beak, and, in his attempts to disengage himself from it by striking his beak against the bark of the tree, the berry sticks to the latter ; and if it happen to light on a smooth part, it will take root, and sprout out the next winter. This plant adheres most readily to the ash and other smooth rinded trees, as the apple.

MOCKING BIRD. The mocking bird, like the nightingale, is destitute of brilliant plumage, but his form is beautiful, delicate and symmetrical in its proportions. His motions are easy, rapid and graceful, perpetually animated with a playful caprice, and a look that appears full of shrewdness and intelligence. He listens with silent attention to each passing sound, treasures up lessons from any thing vocal, and is capable of imitating with exactness, both in measure and accent, the notes of all the feathered creation. As if conscious of his unrivalled powers of song ; and animated by the harmony of his own voice, his music is as it were, accompanied by chromatic dancing and expressive gestures ; he spreads and closes his light and fanning wings, expands his silvered tail, and with buoyant gait, and enthusiastic ecstasy, he sweeps around, and mounts and descends into the air from his lofty spray, as his song swells to loudness, or dies away in sinking whispers. While thus engaged, so various is his talent, that it might be supposed a trial of skill from all the assembled birds of the country ; and so perfect his imitations, that even the

sportsman is at times deceived, and sent in quest of birds that have no existence around.

The feathered tribes themselves are decoyed by the fancied call of their mates ; or dive with fear into the thicket, at the well-feigned scream of the hawk. Soon reconciled to the usurping fancy of man, the mocking bird often becomes familiar with his master ; playfully attacks him through the bars of his cage ; or at large in a room, restless and capricious, he seems to try every expedient of a lively imagination, that may conduce to his amusement. Nothing escapes his intelligent and discerning eye or faithful ear. He whistles perhaps for the dog, who, deceived, runs to meet his master ; the cries of the chicken in distress, bring out the clucking mother to the protection of her brood. The barking of the dog, the piteous wailing of the puppy, the mewing of the cat, the action of a saw, or the creaking of a wheelbarrow, quickly follow, with exactness. He repeats a tune of considerable length ; imitates the warbling of the Canary, the lisping of the Indigo bird, and the mellow whistle of the Cardinal, in a manner so superior to the originals, that mortified and astonished, they withdraw from his presence, or listen in silence, as he continues to triumph by renewing his efforts.

In the cage, also, nearly as in the woods, he is full of life and action, while engaged in song ; throwing himself round with inspiring animation, and as it were, moving in time to the melody of his own accents. Even the hours of night, which consign nearly all other birds to rest and silence, like the nightingale, he often employs in song, serenading the houseless hunter and silent cottager to repose, as the rising moon illuminates the darkness of the shadowy scene. His capricious fondness for contrast and perpetual variety, appears to deteriorate his powers. His lofty imitations of the musical brown thrush, are perhaps interrupted by the crowing of the cock, or the barking of the dog ; the plaintive warblings of the blue bird are then blended with the wild scream and chatter of the swallow or the cackling of the hen ; amid the simple lay of the native robin, we are surprised with the vociferation of the whip-poor-will ; while the notes of the garrulous jay, woodpecker, wren, and many others succeed, with such an appearance of reality, that we almost imagine ourselves in the presence of the originals, and can scarcely realize the fact, that the whole of this singular concert is the effort of a single bird.

MOLASSES. This is the gross fluid matter remaining of sugar after refining, and which no boiling will bring to a consistence more solid than that of syrup ; hence it is also called syrup of sugar. Properly, molasses is nothing else but the sediments of coarse or brown sugar, and that is the refuse of other sugars not capable of being whitened and reduced into loaves. Molasses is used in the preparation of tobacco, and large quantities of it are distilled into rum. As well known, it is extensively used as a cheap substitute for sugar, and

as such is generally considered favorable to health as well as nutritious. But the products of it, when distilled, are most deleterious, especially if freely used as a beverage.

MONEY. The circulation of gold and silver in different ages and in different parts of the world, is a curious and interesting, but, in some respects, a difficult subject of investigation. It appears that those metals were used as a medium of commerce so early as in the time of Abraham ; and that they served as ornamental articles of dress, in a period little less remote ; and, indeed, although we have no authentic information relative to this particular, it is extremely probable that gold and silver were used as ornaments before they were established as a medium of commerce, and the standard whereby to estimate the comparative value of other articles. We may collect from sacred history, that gold and silver, as well as divers kinds of precious stones, were sufficiently plentiful in Egypt at the time of the egress of the Israelites ; and the valuable offerings of the people for the construction of the tabernacle, with all the rich materials of which that structure was composed, as well as those used for the high priest's garment, and in the whole apparatus of religion, were furnished out of those treasures which they had carried from that country ; for no other channel can be discovered, or even with any appearance of probability imagined, by which the Israelites could at that period be supplied with such plenty of those valuable commodities ; for they had not then obtained any wealth by the plunder of enemies ; the spoils of Midian being the first considerable acquisition of this kind after their departure from Egypt ; and the Midianitish war was an event posterior to the construction of the tabernacle.

In regard to commerce, there is no mention made, nor the least appearance of any being carried on by the Israelites, whereby they could have obtained such a stock of valuable materials so soon after their entrance into the wilderness. In their conquests of the land of Canaan, they appear to have sometimes obtained a considerable booty ; but it is not until the reign of David that we observe that profusion of wealth, which seems astonishing in a period of such remote antiquity. And the abundance of gold and silver which Jerusalem displayed in the succeeding reign of Solomon, has staggered the credulity of some readers of the Jewish history. It appears, however, that those metals were at that time very plentiful in Egypt, and in several countries of Asia. The history of David's wars and conquests, make it appear evident that very considerable quantities of gold and silver had, by some means, been introduced into the countries situated between the Euphrates and the Levant Sea ; and it seems that this influx of wealth must have been, in a great measure, the effects of the trade carried on by the Tyrians and Egyptians with the eastern and southern parts of the world. In whatever parts of Africa or Asia these metals were found, it is probable, that they were introduced

into Egypt, and the western parts of Asia, by the Arabian, Egyptian, and Tyrian merchants. The Egyptians, especially, might bring a considerable part of them by their caravans, which, from time immemorial, travelled into Ethiopia, under which name all the interior and southern parts of Africa were formerly comprehended; as the Ethiopian caravans in like manner traded into Egypt.

In the flourishing ages of Greece, gold and silver began to be plentifully introduced into that country, particularly after the conquest of Persia by Alexander, which caused the wealth of that empire to circulate westward. During this time Rome was exceedingly poor, and her warlike citizens possessed a very small quantity of those valuable metals, until the conquest of Macedonia and the Grecian kingdoms of Asia, caused the riches of the east to flow into her bosom. After the Goths and other northern nations began to make successful inroads into the Roman empire, the plunder of its provinces put them in possession of part of its riches; and gold and silver, with which they had before been almost wholly unacquainted, began by their predatory wars to be introduced among them. After the total subversion of the western empire, those riches, which Rome had accumulated by so many centuries of successful rapine, were by degrees diffused over all Europe, and gold and silver introduced into the regions of the north.

It is common to imagine that the more money a country possesses the more affluent is its condition. And that is usually the case. But the cause is often mistaken for the effect. A great quantity of it is necessary to circulate a great quantity of commodities. Rich flourishing countries require abundance of money, and possess the means of obtaining it; but this abundance is the consequence, not the cause of their wealth, which consists in the commodities circulated, rather than in the circulating medium. The wealth which proceeds from industry resembles the copious yet tranquil stream, which passing silently, and almost invisibly, enriches the whole extent of country through which it flows; but the treasures of the new world, like a swelling torrent, were seen, heard, felt, and admired; yet their first operation was to desolate and lay waste the spot on which they fell. The shock was sudden; the contrast was too great. Spain overflowed with specie, while other nations were comparatively poor in the extreme. The prices of labor, of provisions, and of manufactures, bore proportion to the quantity of circulating cash. The consequence is obvious; in the poor countries industry advanced; in the more wealthy it declined.

MONKEY. The general name of the ape, baboon, and simia tribe, the several varieties of which are principally found in the tropical climates. They inhabit forests in prodigious numbers, and, though mischievous, their manners are fantastical and interesting. They have hands like man, and also walk on two legs, but they practice no arts beyond the necessities of the hour. They are affectionate

to their young, and often exhibit great sagacity, but their brain is smaller than that of man, and they are without his risible muscles, and less in size. They throw missiles with great dexterity, and live on vegetables.

MONSOONS. In the Indian ocean these winds are partly general, and blow all the year round the same way, as in the Ethiopic Ocean ; and partly periodical, that is, half the year blow one way, and the other half nearly on the opposite points ; and these points and times of shifting differ in different parts of this ocean. These latter are what we call monsoons. The shifting of these monsoons is not all at once ; in some places the time of the change is attended with calms, in others with variable winds, and particularly those of China, at ceasing to be westerly, are very apt to be tempestuous ; and such is their violence, that they seem to be of the nature of the West India hurricanes, and render the navigation of those seas very unsafe. These tempests the seamen call the breaking up of the monsoons. Monsoons take their name from an ancient pilot, who first crossed the Indian sea by means hereof ; but others derive the name from a Portuguese word, signifying motion or change of wind and sea. Lucretius and Apollonius mention annual winds which arise every year, which seem to be the same with what in the East Indies we now call monsoons.

MONSTER. A monster is a birth or production of a living being, degenerating from the proper and usual disposition of parts in the species to which it belongs : as, when there are too many members, or too few ; or some of them are extravagantly out of proportion, either on the side of excess or defect. Aristotle defines a monster to be a defect of nature, when, acting towards some end, it cannot attend to it, from some of its principles being corrupted. Monsters do not propagate their kind ; for which reason some rank mules among the number of monsters, as also hermaphrodites. Monster is also used for an animal enormous for bulk ; such as the elephant among terrestrial quadrupeds, and the shark and the whale among sea animals ; for other animals remarkable for fierceness and cruelty ; and for animals of an extraordinary species, arising from the copulation of one animal with another of a different genus.

MONTH. In Chronology, the twelfth part of a year, otherwise called a calendar month, to distinguish it from the astronomical month, which is either solar or lunar. A solar month, or the time in which the sun passes through a whole sign of the zodiac, is thirty days sixteen hours twenty-nine minutes five seconds ; a lunar month, or the period of one lunation, is twenty-nine days twelve hours forty-four minutes.

MOON. Our moon is one of the heavenly bodies often ranked among the planets ; but more properly a satellite, or secondary planet. As all the other planets move primarily round the sun, so does the moon

round the earth ; her orbit is an ellipsis, in which she is retained by the force of gravity ; performing her revolution round the earth, from change to change, in twenty-nine days, twelve hours and forty-four minutes, and round the sun with it every year ; she goes round her orbit in twenty-seven days, seven hours, and forty-three minutes, moving about 2290 miles every hour ; and turns round her axis exactly in the time that she goes round the earth, which is the reason of her keeping always the same side towards us ; and that her day and night taken together are as long as our lunar month.

Among the ancients the moon was an object of prime regard. By the Hebrews she was more regarded than the sun, and they were more inclined to worship her as a deity. The new moons or first days of every month, were kept as festivals among them, which were celebrated with sound of trumpets, entertainments, and sacrifice. People were not obliged on these days to rest. The feasts of new moons were the miniature representation of the feast of trumpets, which was held on the first of the month Tisri, which was the beginning of the civil year. The Jews, not being acquainted with the physical causes of eclipses, looked upon them, whether of sun or moon, as signs of the divine displeasure. The Grecians looked upon the moon as favorable to marriage ; and the full moons or the times of conjunction of the sun or moon, were held the most lucky seasons for celebrating marriages ; because they imagined the moon to have great influence over generation. The full moon was held favorable for any undertaking by the Spartans ; and no motives could induce them to enter upon an expedition, march an army, or attack an enemy, till the full of the moon. The moon was supposed both by Greeks and Romans to preside over childbirth. The patricians at Rome wore a crescent on their shoes, to distinguish them from the other orders of men. This crescent was called *Lanula*. Some say it was of ivory, others that it was worked upon the shoe, others that it was only a particular kind of fibula or buckle.

MOROCCO. This is a fine kind of leather, prepared of the skin of an animal of the goat kind, in the countries of the Levant. The name was probably taken from the kingdom of Morocco, whence the manner of preparing it was borrowed. The skins are steeped twenty-four hours in a river, taken out, stretched on the leg, beat with the knife, returned into the water for twenty-four hours, rebeaten on the leg, re-steeped, thrown into a vat, and, for three weeks taken out and returned every morning, to dispose them to peel. Being taken out for the last time, they are scraped with the knife, and when the hair is quite off, thrown into pails of fresh water, where they are rinsed, then the flesh side is scraped, thrown into the pails, and thus alternately from the leg to the pails, till they leave the water clean. They are then put into lukewarm water, with the sumac, and, after twelve hours, rinsed in clear water, and scraped on the leg on both

sides, pounded in pails, and the water changed three times; then wrung and stretched on the leg, and passed after each other into water, with alum dissolved in it. Thus alumed, they are left to drain till the morning, then wrung out, pulled on the leg, and folded from head to tail, the flesh inward. In this state they receive their first dye, by passing them from one to another in a red liquor, prepared with lacca, and some other ingredients.

MOSS. A parasitic plant, something like down, and adheres to the trunks of trees, and was formerly supposed to be merely an excrescence, but is now found to be a perfect plant, having roots, flower, and seeds, yet cannot be propagated by seed. It is oftentimes very injurious to fruit trees, and ought to be scraped off in the spring season and in moist weather.

MOTH. The clothes-moth itself is perfectly innocuous. The devastation is committed by the caterpillar. This begins to form a nest as soon as it quits the egg. For this purpose, having spun a thin coating of silk around its body, it cuts filaments of wool or fur close to the thread of the cloth, and applies the pieces to the outside of its case. This covering it never leaves, except in cases of urgent necessity. When it wishes to feed, it puts out its head at either end of the case, as may be most convenient. When it wishes to change its position, it protrudes its head and about half its body, and thus moves forward, dragging its case by fixing its hinder legs firmly in it. When, from its increase in size, the case becomes too small, it makes an addition to it at each end. This operation can be readily traced by transferring it from cloth of one color to another, when each addition will be conspicuous, from the difference of color. After changing into a chrysalis, it remains quiescent for about three weeks, when a small nocturnal moth, of a silvery-gray color, comes forth, but too well known to almost every mistress of a family.

The usual mode of destroying these pests is by oil of turpentine, camphor or tobacco, all of which will answer the purpose to a certain degree; but all have the disadvantage of communicating odors to the clothes, to which they have been applied, extremely disagreeable to many persons. As moths never attack unwashed wool, and even abandon the places where it is kept, this substance may be advantageously substituted for the above mentioned articles, by placing it in layers between clothes, or keeping small parcels in the corners of shelves or drawers. For this plan to be effectual, the wool must be used as it comes from the back of the animal, before any cleansing process has been employed that will deprive it of its natural oil or smell.

MOTT'S AGRICULTURAL FURNACE. This is undoubtedly the best apparatus for cooking vegetables and other food for stock that has been devised. The largest size holds 120 gallons, and the smallest only fifteen gallons, and there are seven intermediate sizes,

with a progressive increase of capacity. It can be placed and used in the open air, or in any enclosed room where the smoke can be conveyed to a chimney through a common stove pipe. It is also well adapted to the various household purposes where a large quantity of water is to be heated. The cooking is effected with great rapidity, and requires only a small amount of fuel. The apparatus consists of two kettles, one within the other, and united at the top. The dimension of the inner one is so much less than of the outer one as to leave a space all round between them from one to three inches, according to the size of the kettle. The outside kettle is so connected with the furnace at the bottom which receives the fuel, that the heat rises into, and circulates in every part of the space between the kettles. No



MOTT'S AGRICULTURAL FURNACE.

heat, therefore, passes off in the flue, or by mixing with the surrounding air, till it has been brought in contact with, and expended upon the surface, which encloses the substances to be affected by it. Our own, which holds thirty gallons, can make water boil in less than half an hour ; and then the merest trifle of fuel is wanted to keep up the temperature and to complete the process of cooking. We have had it in use from three to four years ; and, so great is our confidence in the economy of cooking food for stock, and in the adaptation of this furnace for the purpose, that we considered the value of it to us the first winter was more than an equivalent for its cost, which was fifteen dollars. To others of more extensive farming operations the importance of its use would be greatly augmented.

MOULDINESS. A term applied to an appearance in bodies which are much exposed to the humidity of the atmosphere, and which shows itself by a kind of white down, or lanugo, on their surface. It is liable to affect different articles of farm produce, unless guarded against by depositing them in proper dry places. This mouldiness, when viewed with a microscope, affords a curious spectacle; being a kind of meadow, out of which arise herbs and flowers; some only in the bud, others full blown, and others decayed; each having its little root, stalk and other parts. The same may be observed of the mouldiness which gathers on the surface of liquid bodies. Mr. Bradley observed this mouldiness in a melon very accurately, and found the vegetation of these little plants to be exceedingly quick. Each plant had its seeds in great abundance, which did not seem to be three hours before they began to shoot up; and in six hours more the new plant was complete and mature, and the seed ready to fall. When the fruit had been covered with a mould for six days, its vegetative quality began to abate, and it was entirely gone in two days more; then came on a putrefaction, and the fleshy part of the melon yielding nothing but a stinking water, which began to have a gentle motion on its surface; and in two days' time maggots appeared, which in six more laid themselves up in their bags, where they continued four days, and then came out flies. These maggots were owing to the eggs of flies deposited in the putrefaction.

MOULTING. Among farmers, a term signifying the changing of the feathers in animals of the domestic bird kind. It is a process which takes place annually towards the latter end of the year, when care should be taken to have them well fed, and kept as much as possible in a sheltered situation. In some sorts of birds, as the goose, advantage is taken of this season for collecting the feathers for various useful purposes. Moulting is sometimes applied to horses, when they alter, change, or cast their coats towards the latter end of autumn. As they become weak at this period, they should be well kept, and not have too much work. Great care should likewise be taken in the cleaning and dressing of them.

MOUTH. In some creatures the mouth is wide and large, in others little and narrow; in some it is formed with a deep incisure into the head, for the better catching and holding of prey, and more easy comminution of hard, large, and troublesome food; and in others with a shorter incisure, for the gathering and holding of herbaceous food. In birds it is neatly shaped for piercing the air; hard and horny, to supply the want of teeth; hooked, in the rapacious kind, to catch and hold their prey; long and slender in those that have their food to grope for in moorish places; and broad and long in those that search for it in the mud. Nor is the mouth less remarkable in insects; in some it is forciptated, to catch, hold, and tear the prey; in others, aculeated, to pierce and wound animals, and suck their blood; in

others strongly rigid, with jaws and teeth, to gnaw and scrape out their food, carry burdens, perforate the earth, nay, the hardest wood, and even stones themselves, for houses and nests for their young.

MUCILAGE. A soft glutinous substance, made by dissolving different kinds of gum ; or the roots, leaves, or other parts of plants that abound with it. Mucilaginous drinks and mixtures are very useful in disorders of the bowels, and in catarrhs, where our object is to cover any acrid matter, so as to prevent its irritating the parts over which it passes. A solution of gum arabic, an infusion of linseed, or water gruel, are all to be considered as mucilaginous drinks.

MUCK. This is the common name for peat, marsh mud, and decaying vegetable matter generally. The value of it in restoring fertility to declining soils that have long been used for tillage, is a matter of common sense, and has been well tested by the experience of our best farmers. The swamps and bogs, and all low lands that have been uncultivated, consist, in no small measure, of what has been washed upon them from the adjacent hills and uplands, as well as of the decayed substances that have there been accumulating for an unknown succession of years. These substances are the essence of all vegetable composition ; and, whenever collected, duly prepared and properly applied to fields to be used for tillage, it is apparent that the provident husbandman may expect a good crop. The value, however, of muck, as a fertilizer, will greatly depend on the fact of the swamp or bog having been able to retain without waste the vegetable elements that may have there been collected. For, if there has been a stream of water running through it, the soluble portions of the mud must have been partially separated from the vegetable remains, and washed away ; whereas, the muck taken from those swamps or bog-holes, having no mode of discharging their water, except by evaporation, retain most of the soluble portions of their animal and other organic remains, and consequently is richer in nitrogen and fertilizing salts.

In dry seasons, the prudent farmer will be industrious in removing or carting muck from evaporated swamps or other sunken places on or near his farm, and composting it with the dung or urine of animals, night soil, soap suds, or other putrescent matter ; or, what is better, to lay it in his barnyard, pigsty, or sheepfold, and let it become thoroughly mixed with the dung and urine of his stock. When thus managed, the compost is excellent, and suitable for almost any variety of soil, though best for those that are sandy and light. The majority of farmers in this way might annually double the amount of their crops, as well as add much to the value of their farms. All farms are not alike favorably situated for being thus enriched, but there are a few only, and it is believed not any, but what might be vastly benefited in this way, if the proprietors were duly observant of the means for doing it.

MURIATIC ACID. Muriatic acid is generally in a liquid form, having a strong and pungent smell, and a taste very sour and caustic ; exposed to the air, it emits white fumes. It is a solution of the muriatic acid gas in water, which deserves attention in a medical point of view, as being employed in fumigation for destroying contagion. It is extricated for this purpose by pouring sulphuric acid on common salt, by which the fumes of muriatic acid are disengaged, and sulphate of soda is formed. Muriatic acid has been successfully administered in typhus and scarlet fever, in the proportion of a dram to a pint of gruel or barley water, with sugar or syrup to correct its acidity, and to render it more palatable. This mixture is to be used for common drink ; but must not be put into a leaden or pewter vessel or spoon. It is recommended as good against worms, in the dose of from five to twenty drops in a strong infusion of quassia, frequently repeated.

MURRAIN. Murrain, or gargle, is a contagious disease incident to cattle. The symptoms are, a hanging down and swelling of the head, abundance of gum in the eyes, rattling in the throat, a short breath, palpitation at the heart, staggering, a hot breath, and a shining tongue. To prevent this disease, the cattle should stand cool in summer, and have plenty of good water. All carrion should be speedily buried ; and as the feeding of cattle in wet places, on rotten grass and hay, often occasions this disease, dry and sweet fodder should be given them.

MUSCLE. The parts that are usually included under this name consist of distinct portions of flesh, susceptible of contraction and relaxation ; the motions of which, in a natural and healthy state, are subject to the will ; and, for this reason, they are called voluntary muscles. Besides these, there are other parts of the body that owe their power of contraction to their muscular fibres ; thus the heart is a muscular texture, forming what is called a hollow muscle ; and the stomach, intestines, &c., are enabled to act upon their contents, merely because they are provided with muscular fibres ; these are called involuntary muscles, because their motions are not dependent on the will. The muscles of respiration being, in some measure, influenced by the will, are said to have a mixed motion.

MUSHROOM. A plant remarkable for the quickness of its growth and decay, for the remarkable bad smell it diffuses when in a state of decay, and for yielding a nutritive article for the table. Care must be taken that those eaten are of the right sort, as there are several funguses resembling them that are highly poisonous. The marks of good esculent mushrooms are the following. The true mushrooms are known by their external whiteness, and by being of a pale red within when young, and of a deeper red, or dark, when older ; they are at their first appearance of a round figure, and not much larger than a small nut ; after they have a little unfolded their membranes, they appear red full, and close ; on the top is a disagreeable softness,

equal, and white ; the matter within is very white, with short and thick stalks. They grow in fertile ground and should be gathered for eating as soon after springing up as possible, for they then contain an oily and a saline part, and if they stay long before they are gathered, their salts become more active and hurtful. Another species of mushrooms, is that kind which produces the circular appearances in fields, and called fairy rings. Its substance is tough, and consequently it is used only to make catchup, or in powder.

MUSK. A substance secreted into a kind of bag in the umbilical region of the moschus moschifer. It is of a brown red color, feels unctuous, and has a bitter taste. Its smell is aromatic and intensely strong. It is partially soluble in water, which acquires its smell ; and in alcohol, but that liquid does not retain the odor of the musk. Musk is dissolved by nitric and sulphuric acids, but the odor is by them destroyed. Fixed alkalies develop the odor of ammonia.

MUTTON. Mutton is the flesh of sheep ; and perhaps in no one point has the skill of the breeder of animals been more marked, than in that of producing breeds of sheep, in which the greatest amount of flesh, and the smallest quantity of offal, seems to have reached a point beyond which progress will be difficult. The quality of mutton is greatly depending on the age of the animal, and the mode of feeding. Its general use in England, has caused great attention to producing it of superior quality, and the success has been unrivalled elsewhere. To be first-rate mutton, the sheep should not be less than five years old, and as a general rule, it may be said the older the mutton the finer the flavor, in this respect differing from most other meats. The flesh of mutton five or six years old will be firm, dark colored, and when cooked full of the richest gravy, while at two or three, the flesh will be comparatively light colored, and be soft and flabby. As a general rule wether mutton is superior to that of ewes of the same age, though connoisseurs in this flesh assert that a maiden or spayed ewe of five years old, produces mutton preferable to any other. The south downs are highly prized for mutton, and their reputation in this respect abroad, has been well sustained here.

MUSQUITOES. Small insects which abound in countless multitudes in the East and West Indies, and are particularly annoying, especially to new comers. They inflict a small wound, which is soon surrounded by a pimple, accompanied by troublesome itching ; and in some cases so numerous are those annoying bites, that a great degree of general fever is induced. The best application is lemon juice. It is fortunate that the bites of these insects seem to produce a certain change in the blood, which renders it disagreeable to them afterwards, as those who have occasion to visit warm countries often, are rarely attacked by them with much violence on their second or subsequent voyages.

MYRTLE. A genus of plants consisting of aromatic trees or

shrubs, with simple opposite leaves, which are sprinkled with pellucid glandular points, and having axillary or terminal white or rose-colored flowers. One species, the common myrtle, is a native of the south of Europe, and other countries bordering on the Mediterranean. It has been celebrated from remote antiquity on account of its fragrance and the beauty of its evergreen foliage, and, by different nations, was consecrated to various religious purposes. Myrtle wreaths adorned the brows of bloodless victors, and were the symbol of authority for magistrates at Athens. With the moderns, it has always been a favorite ornamental plant, and is commonly cultivated in gardens both in Europe and America. Pimento or allspice is the produce of a species of myrtle inhabiting tropical America, and consists of the berries, which are collected before they are ripe, and dried in the sun.

NAIL. A bony excrescence, growing at the ends of the fingers and toes of men and animals. The several parts of nails have their respective names. The extremity is called the apex; the opposite end, the root or base; and the white part near the latter, somewhat resembling a half moon, lunula. The substance of the nail is that of the skin, hardened, but firmly connected with it. For this reason, it is extremely sensible at its root, where the substance is yet tender; but at the apex, where it is perfectly hardened, capable of being cut without pain.

NANKEEN. A well known cotton stuff, deriving its name from the ancient capital of China. According to Van Braam, it is manufactured in the southeast of the province of Kiang-nam upon the seashore. The color of nankeen is natural, the cotton down of which it is made being of the same tinge with the cloth. The color, as well as superior quality of this cotton, seems to be derived from the soil; for it is said that the seeds of the nankeen cotton degenerate in both particulars when transplanted to another province, however little different in its climate. The common opinion, that the color of the stuff is given by a dye, occasioned an order from Europe, some years ago, to dye the pieces of nankeen of a deeper color than they had at that period; and the reason of their being then paler than formerly is as follows;—"Shortly after the Americans began to trade with China, the demand increased to nearly double the quantity it was possible to furnish. To supply this deficiency, the manufacturers mixed common white cotton with the brown; this gave it a pale cast, which was immediately remarked; and for this lighter kind no purchaser could be found till the other was exhausted. But the demand afterwards lessening, the white cotton was no longer mixed with it, and the color returned to its former standard."

NASTURTIIUM. Indian Cress is a frequent name for this plant. It is a native of South America, and is distinguished for its brilliant show of orange and crimson colored flowers. It was carried to England in the sixteenth century. Being a good climber, it is useful in

covering a trellis or lattice as a screen, and for its gay dress is often made a tenant of the flower garden. As so few culinary vegetables are considered ornamental, we heartily recommend the *Nasturtium* to the attention of every person having a kitchen garden. Let it be placed in a conspicuous situation. Few things are more attractive in appearance; and it is useful as well as beautiful. In addition to the gaiety of its successive blossoms, the fruit, when pickled, is desirable, and by many esteemed superior to capers. The tops, too, by some are used for salad.

NATURE. Of this word, which occurs so frequently, with significations so various and so difficultly defined, Boyle has given the following explication:—Nature is sometimes used for the author of nature, as, Nature has made man partly corporeal and partly immaterial; for Nature, in this sense, may be used the word Creator. Nature sometimes means that on whose account a thing is what it is, and is called, as when we define the nature of an eagle; for nature, in this sense, may be used for essence, or quality. Nature sometimes means what belongs to a living creature at its nativity, or accrues to it by its birth, as when we say a man is noble by nature, or a child is naturally froward. This may be expressed by saying, the man was born so, or the thing was generated such. Nature sometimes means an internal principle of local motion, as we say the stone falls, or the flame rises, by nature; for this we may say that the motion up or down is spontaneous, or produced by its proper cause. Nature sometimes signifies the established course of things corporeal, as nature makes the night succeed the day; this may be termed established order, or settled course. Nature means sometimes the aggregate of the powers belonging to a body, especially a living one; as when physicians say that nature is strong, or nature left to herself, will do the cure; for this may be used constitution, temperament, or structure of the body. Nature is put likewise for the system of the corporeal works of God; as there is no phoenix or chimera in nature. For nature, thus applied, we may use the world, or the universe. Nature is sometimes, indeed commonly taken for a kind of semi-deity; in this sense it is best not to use it at all.

NAVIGATION. No art or profession has appeared more astonishing and marvellous than that of navigation, in the state in which it is at present. This cannot be made more evident than by taking a retrospective view of the tottering, inartificial craft to which navigation owes its origin; and by comparing them with the noble and majestic edifices now in use, containing a thousand men, with their provisions, drink, furniture, wearing-apparel, and other necessities for many months, besides a hundred pieces of heavy ordnance, and carrying all this vast apparatus safely, on the wings of the wind, across immense seas. These majestic floating structures are the result of the ingenuity and united labor of many hundreds of hands, and are com-

posed of a great number of well-proportioned pieces of timber, nicely fastened together by means of iron nails and bolts, and rendered so tight with tow and pitch, that no water can penetrate into any part.

To give motion to these enormous machines, lofty pieces of timber called masts, have been fixed upright in them; and sails of linen cloth are placed for the purpose of catching the wind, and receiving its propelling power. It has been requisite also to add vast quantities of cordage and tackling. Yet all these would be insufficient for the perfect government and direction of the vessel, if there were not fastened to the hinder part of it, by means of hinges and hooks, a moveable piece of wood called the rudder, very small in proportion to the whole machine, but the least inclination of which to either side is sufficient to give immediately a different direction to the enormous mass; so that two men may direct and govern this floating town, with the same or with greater ease than a single man can direct a boat. Even the vaulted part of the fabric, together with its sharp termination underneath, is proportioned according to the nicest calculations; and the length, width, and strength of the sails and tackling, are all in due proportion to one another, according to certain rules founded upon the principles of the art of ship-building. A violent storm of wind will make us tremble with fear in a well-built house, in the midst of a populous city; but the seaman, provided he has a good ship, rides with unshaken courage, amidst the enraged waves, when the whole surface of the ocean presents to the eye an awful scene of immense watery mountains and bottomless precipices.

NATURAL HISTORY. This branch of useful knowledge is a generic term, and presents topics of great interest and utility. It has more commonly been used for a systematic description of that part of nature which is immediately connected with man and human wants, although formerly embracing a wider range of investigation. Thus limited, natural history is a science both useful and entertaining. It is intimately connected with all the other sciences; and with all the arts, from the simplest and rudest to the most complicated and most elegant. We cannot well avoid becoming more or less acquainted with the manners of animals, the economy of vegetables, and the general appearance of nature. From an acquaintance with these, many advantages have already accrued to man; and, from a more intimate knowledge of them, many more will doubtless be derived. The husbandman ought to know the characters of the tame animals which he employs; what advantages are to be derived from them; whether there are others that would suit his purpose better; where they are to be found; how they may be procured, and how supported; the qualities of the soil which he cultivates, and the means of managing and of improving it; the nature of the grains and grasses which he raises, and whether he might not, with advantage, substitute a different species for that in common use. Even the meanest mechanic

should have a pretty accurate knowledge of many of the qualities of those natural objects with which his craft is connected. The fine arts, though usually considered as the peculiar province of imagination, depend greatly also upon natural history.

From the vicissitudes of the seasons acting upon the senses; from the presence of surrounding objects; from the necessity of deriving from them food, clothing, and shelter; natural history must have been a study of the first importance to man, and attended to from the earliest periods of society. Before the invention of letters, however, the observations and discoveries of individuals were neither likely to be communicated to those at a distance, nor recorded for the information of posterity. In a more polished state of society, the case is different; and hence we find Alexander the Great decreeing a collection of animals for the examination of Aristotle; and wild beasts, from every quarter of the globe, produced and exhibited in the amphitheatres at Rome. Yet Aristotle is almost the only ancient writer on zoology that merits attention; for even Pliny and Ælian, with this great example before their eyes, offer us nothing but crude collections, discriminated with little taste or judgment, truth and falsehood being blended in one common mass: and for many succeeding years, from various causes, all Europe is well known to have been immersed in ignorance and credulity as to the most common facts of this study.

The bodies, as well of plants as of animals, consist of fluids and solids; they have both vessels designed to contain the fluids, and glands to secrete different juices: while the blood circulates through the bodies of animals, the sap of vegetables ascends and descends, so as to produce the same effects on the vegetable, which the motion of the blood, by the force of the heart and the arteries, produces on the animal system. These are but a few of the resemblances which have been observed between the species of the animal and those of the vegetable kingdom. Almost every one of the parts common to animal bodies, has been represented by one naturalist or another, as matched by some correspondent part in vegetable bodies. Such analogies are sometimes plain and striking, and sometimes scarcely perceptible, or merely imaginary. They afford, however, an agreeable subject of speculation; and it cannot be denied that they increase the difficulty of ascertaining the limits by which these two departments of nature are divided. But however numerous and strong the analogies between animals and vegetables, however difficult it may be to discern the precise line which separates the one kingdom from the other, yet the leading characteristics are sufficiently distinct. The privileges which animals enjoy above the other parts of the creation, are in most instances highly conspicuous.

Animals have an organized structure, which regularly unfolds itself, and is nourished and supported by air and food; they consequently possess life, and are subject to death; they are moreover

endowed with sensation, and with spontaneous, as well as voluntary, motion. Vegetables are organized, supported by air and food, endowed with life, and subject to death as well as animals. They have, in some instances spontaneous, though we know not that they have voluntary motion. They are sensible to the action of nourishment, air, and light, and either thrive or languish, according to the wholesome or hurtful application of these stimulants. The spontaneous movements of plants are almost as readily to be observed as their living principle. The general direction of their branches, and especially of the upper surface of their leaves, though repeatedly disturbed, to the light, the unfolding and closing of their flowers at stated times, or according to favorable or unfavorable circumstances, with some still more curious particulars, are actions undoubtedly depending on their vital principle, and are performed with the greater facility in proportion as that principle is in its greatest vigor. Plants alone have a power of deriving nourishment, though not indeed exclusively, from inorganic matter, mere earths, salts, or airs, substances certainly incapable of serving as food for any animals, the latter only feeding on what is or has been organized matter, either of a vegetable or animal nature. So that it would seem to be the office of vegetable life alone, to transform dead matter into organized living bodies.

NEEDLE. A name given to various small instruments in the useful arts. The most common acceptance of the word is to denote the common sewing-needle, which is so well known as to require no description: besides this, there is the knitting-needle; the netting-needle; the glovers-needle, with a triangular point; the tambour-needle, which is made like a hook, and fixed in a handle; the hook being thrust through the cloth, the thread is caught under the hook, and the needle is drawn back, taking the thread with it. Needle is a name given to a part of the stocking-frame, lace-machine, and many other machines in the manufactures. The manufacture of sewing-needles, is one of the most remarkable pursuits of the age, both technically and locally. In a technical point of view, it is striking for the number of processes which every individual needle passes through; while it is not less noteworthy on account of the grouping of the manufacture about one town of England in particular—Redditch, in Worcestershire—where it has been calculated there are sixty or seventy millions made every week! In our own country, but few attempts in this important branch of artistic industry have been made. It is said, however, that in the recent ones at Newark, (N. J.,) the results promise a degree of success highly auspicious to the enterprising individuals who made them.

NECTARINE. The nectarine is only a variety of the peach, with a smooth skin. In its growth, habit, and general appearance, it is impossible to distinguish it from the peach. The fruit, however, is rather smaller, perfectly smooth, without down, and is one of the

most wax-like and exquisite of all productions for the dessert. In flavor, it is perhaps scarcely so rich as the finest peach, but it has more piquancy, partaking of the noyau, or peach-leaf flavor. The culture of the nectarine is, in all respects, precisely similar to that of the peach, and its habits, also, are completely the same. It is longer lived and hardier when budded on the plum, but still the nurserymen here usually work it on the peach stock.



NEWFOUNDLAND DOG.

NEWFOUNDLAND DOG. The Newfoundland dog is of the Spaniel family, but derives its name from the island of which it is a native. It is usually of a large size, and has long shagged hair, with a coat of fine, soft fur beneath the outer covering, which is almost impenetrable by water. His color is most frequently black; sometimes spotted, and partially flecked or grayish; and occasionally buff. He is remarkably docile and obedient to his master; and, although very serviceable as a watch dog, when well trained, is good natured to all not suspected of mischievous intentions upon the property of his owner. He will defend his master and his master's property, and suffer no person to injure the one or the other; and however extreme may be the danger, he will not leave them for a minute. He seems only wanting in speech, in order to make his good feelings and wishes known to all around him.

One of the most striking traits of the Newfoundland dog, is his fearlessness of water, and particularly as connected with the preservation of human life. A writer in the Farmer's Library, Mr. Youatt, gives the following narrative illustrative of this trait. A native of Germany was travelling one evening on foot in Holland, accompanied

by his large dog. Walking on a high bank which formed one side of the dyke, his foot slipped, and he was precipitated into the water, and being unable to swim, soon became senseless. When he recovered his recollection, he found himself in a cottage on the contrary side of the dyke, surrounded by peasants, who had been using the means for the recovery of drowned persons. The account given by one of them was : that returning home from his labor, he observed, at a considerable distance, a large dog in the water, swimming and dragging, and sometimes pushing along, something that he seemed to have great difficulty in supporting, but which he at length succeeded in getting into a small creek on the opposite side. When the animal had pulled what he had hitherto supported, as far out of the water as he was able, the peasant discovered that it was the body of a man, whose face and hands the dog was industriously licking. The peasant hastened to a bridge across the dyke, and having obtained assistance, the body was conveyed to a neighboring house, where proper means soon restored the drowned man to life. Two very considerable bruises, with marks of teeth, appeared, one on his shoulder, and the other on his poll ; hence it was presumed that the faithful dog had at first seized his master by the shoulder, and swam with him in this manner for some time, but that his sagacity had prompted him to quit his hold, and shift it to the nape of his neck, by which he had been enabled to support the head out of the water ; and in this way he had conveyed him nearly a quarter of a mile before he had brought him to the creek, where the banks were low and accessible.

NIGHT. That part of the natural day during which the sun is underneath the horizon ; or that space wherein it is dusky. Night was originally divided by the Hebrews, and other eastern nations, into three parts or watchings. The Romans, and afterwards the Jews from them, divided the night into four parts, or watches, the first of which began at sunset and lasted till nine at night, according to our way of reckoning ; the second lasted till midnight ; the third till three in the morning ; and the fourth ended at sunrise. The ancient Gauls and Germans divided their time not by days but by nights ; and the people of Iceland and the Arabs do the same at this day. The like is also observed of our Saxon ancestors.

NIGHT-AIR. Many diseases are brought on by imprudent exposure of the body to the night-air ; and this, at all seasons, in every climate, and variety of temperature. The causes of this bad property of the night-air, it is not difficult to assign. The heat is almost universally several degrees lower than in the daytime ; the air deposits dew and other moistures ; the pores of the body are open, from the exercise and fatigues of the day ; the evening feverishness leaves the body in some degree debilitated and susceptible of external impressions ; and from all these concurrent causes, are produced the various effects of cold acting as a check to perspiration ; such as catarrhs,

sore throats, coughs, consumptions, rheumatisms, asthmas, fevers and dysenteries. In warm climates, the night-air and night-dews, with their tainted impregnations, act with much malignancy on the unwary, who too often, after an imprudent debauch, still more absurdly lays himself down in the woods or verandahs, to receive the full attacks of the morbid powers then unusually active.

In civilized life, and in crowded towns, how many fall victims to their own imprudence, in exposing themselves to the cold, the damp, and the frostiness of the night-air. Issuing from warm apartments with blazing fires, or from crowded churches, theatres, or ball-rooms, with exhausted strength, profuse perspiration, thin dresses, and much of the person uncovered, how many are arrested with the benumbing cold and the universal shivering, which prove the forerunner of dangerous inflammation of the brain, of the lungs, or of the bowels, which either cut them off in a few days, or lay the foundation of consumption or other lingering illnesses. Such being the dangers of exposure to the night-air, it ought to be inculcated on all, both young and old, to guard against them, by avoiding all rash and hasty changes of place and temperature, by hardening the frame by due exercise and walking in the open air in the daytime; and on occasions when the night-air must be braved, taking care to be sufficiently clothed; and to avoid drawing in the cold air too strong or hastily with the mouth open.

NIGHTMARE. Nervous or indisposed persons are oppressed during sleep with a heavy pressing sensation on the chest, by which respiration is impeded, or the circulation of blood intercepted, to such a degree as to threaten suffocation. Frightful ideas are recollected on waking, which occupied the dreaming mind. Frequent attempts are made to cry out, but often without effect, and the horrors and agitations felt by the patient are inexpressibly frightful. The sensations generally originate in a large quantity of wind or indigestible matter in the stomach of supper-eaters, which pressing the stomach against the diaphragm, impede respiration, or render it short and convulsed. Inflated intestines may likewise produce similar effects, or mental perturbations.

There is another species of nightmare mentioned by authors, which has a more dangerous tendency; and this arises from an impeded circulation of blood in the lungs, when lying down, or too great relaxation of the heart and its impelling powers. Epilepsy, apoplexy, or sudden death, are sometimes among the consequences of this species of disturbed sleep.

NIGHT-SOIL. Human excrements are usually known under this name, which is one of the best fertilisers. The history of the use of the night-soil, as a manure, is attended with difficulties; for the very nature of it predisposes every experimentalist in our country as well as England, to be silent as to his knowledge of its powers. Many

absurd prejudices are entertained by the laboring classes ; such as the imaginary taste it imparts to vegetables, when added to the soil ; and in the earliest authorities, it is mentioned with cautious reserve. Long experience, however, has taught many nations the value of this manure. In China it is preserved with the greatest care, mixed with a fat marl ; and according to Sir George Staunton, is made into cakes, which after being dried in the sun, constitute a regular article of traffic between the citizens and the cultivators of that singular empire. The same useful practice is carried on in Belgium. What we too often throw into our rivers, or allow to waste itself in the open air, or in deep vaults, the more thoughtful Belgians turn to account ; what is a nuisance in American cities, is a source of revenue at Brussels.

The best mode of preparing night-soil for use is by mixing it with powdered charcoal, half burnt peat, or soil that is rich in vegetable matter. Quick lime has been applied to it for a similar purpose ; but, although it destroys the odor, it dissipates, at the same time, a large portion of the ammonia. During the decomposition of night soil, an evolution of carbonic acid, ammonia, sulphureted and phosphureted hydrogen takes place. After the escape of these gases, the odor ceases, and the remainder, when dried, constitutes what is sold in large cities under the name of *poudrette*. The odor of recent night-soil may be destroyed, and the volatile elements retained, by adding to it gypsum, or dilute sulphuric acid. This manure is used in the form of compost and as a top dressing in the form of *poudrette*. One of our most scientific writers remarks, that rich as are the liquid evacuations of the barn-yard and horse-stable, they are surpassed by those of the farmer's own dwelling, especially when it is considered with what ease these last may be preserved. If it be a fact, that each man, as asserted, evacuates annually, enough to manure an acre of land, it is easy to form some estimate how much might be added to our agricultural products without material increase of labor, if all the night-soil of the country, in cities especially, were properly saved.

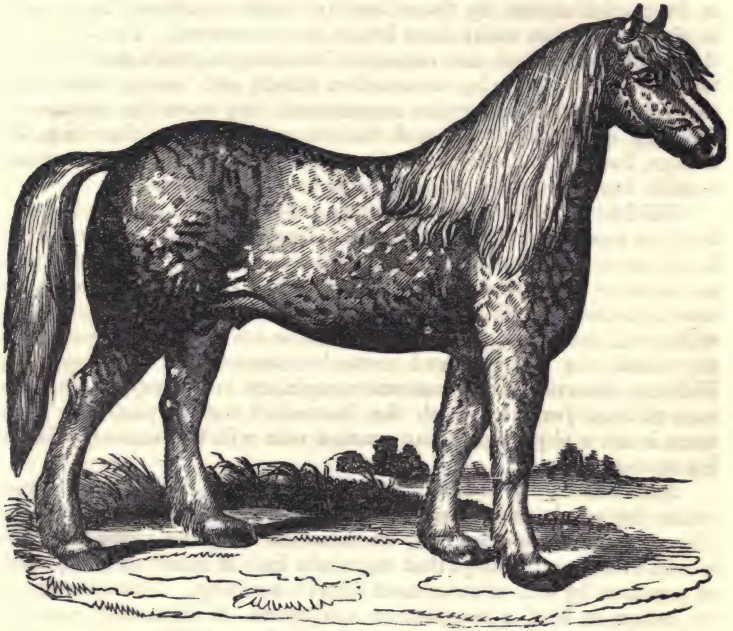
NITRE. Saltpetre ; a perfect neutral salt, formed by the union of the nitrous acid with the fixed alkali of tartar. It is found immersed in imperceptible particles, in earthy substances, as the particles of metals in their ores ; but sometimes it is gathered native and pure, in the form of an efflorescence, or shapeless salt, either on its ore, or on old walls. The earth from which nitre is made, both in Persia and the East Indies, is a kind of marl, found on the bare sides of hills exposed to the northern or eastern winds, and never in any other situation. The people of those countries collect large quantities of this earth ; and having a large and deep pit, lined with a hard and tenacious kind of clay, they fill it half full of water, and into this they throw the earth. When this is broken and moulded to powder, they add more water, and, mixing the whole together, suffer it to remain

four or five days. After this, they open a hole made in one of the sides of the pit, which lets out all the clear water into a channel of about a foot wide, which is also lined with clay, and through which it runs into a very wide and shallow pit, which is prepared in a level ground, secured by slight walls on all but the northeast side, and open to the sun at the top. Here the water evaporates by degrees; and the salt which it had imbibed from the earth, crystallizes into small, brownish white, hexaedral, but usually imperfect crystals. This is the rough saltpetre brought from the East Indies. There are some other methods of procuring it; but the far greater part of the nitre used in the world, is prepared in this manner. Saltpetre is of great use in various manufactures. Besides being the basis of gunpowder, it is employed in making white glass, and is of the same use as common salt in preserving meats. From the same substance, also, are prepared Glauber's spirit of nitre, sweet spirit of nitre, vitriolated nitre, and aquafortis.

NITROGEN. Nitrogen, also called Azote; a substance existing in great abundance, but is never found except in combination with some other body. It is a principal component part of the air we breathe, which consists of 78 parts of nitrogen, and 22 of oxygen. It is accordingly here united with oxygen, and a certain portion of caloric and light. The nitrogen and oxygen of the atmospheric air may be separated, so that we may have the nitrogen by itself, but then only in a state of gas, and its properties are very different from those of the atmospheric air. Nitrogen gas will not support animal life. It is a little heavier than atmospheric air, elastic, and capable of expansion and condensation. It produces no change on vegetable colors, and when mixed with limewater does not make it milky, as does carbonic acid gas. Nitrogen gas and oxygen gas artificially mixed, in proportions in which air is found in the atmosphere, have exactly the same properties as atmospheric air, which they become, in every respect. All animal and vegetable substances contain a large proportion of nitrogen.

NORMAN HORSE. It is not the design of the present work to discuss the nice points resulting from the crosses of our best farm animals. This is left for more elaborate treatises, and to persons more competent to the task. We aim only at calling attention to some of these most prominent points. By them it will be perceived that there is a vast difference in the appearance and also in the merits of them, and hence the great importance to our rural interests, that general public attention should be directed to the subject. Of the horse family there is much in the Norman branch to elicit observation. They are of Arabian descent, and are much used in France, particularly for drawing the heavy diligence coaches. The admired Canada horses are more or less a mixture of this stock. A writer in the *British Quarterly Journal of Agriculture*, says, the Norman horses are capital

in the collar for hard work and scanty fare. They are enduring and energetic beyond description; also that they are gentle and docile; never kicking or becoming otherwise vicious; so that any person may pass about hundreds of them in perfect security. For further particulars respecting these horses, see *Genesee Farmer*, *Albany Cultivator*, *Allen's Domestic Animals*, and a valuable work on the *Structure and the Diseases of the Horse*, published by Derby and Miller, Auburn, N. Y., being Youatt revised and enlarged, by W. C. Spooner and Henry S. Randall.



NORMAN HORSE.

NORTH. One of the four cardinal points of the world; being that point of the horizon which is directly opposite to the sun in meridian. The north wind is generally accompanied with a considerable degree of cold. It sometimes blows with almost irresistible fury. It is often mentioned by the classic authors under the name of Boreas, which is of Greek original.

NUT, COCOA. The fruit of the *cocos nucifera* of Linnæus. Within the nut is found a kernel, as pleasant as an almond, and also a large quantity of liquor resembling milk, which the Indians greedily drink before the fruit is ripe, it being then pleasant, but when the nut

is matured the liquor becomes sour. Some full grown nuts will contain a pint or more of this milk, the frequent drinking of which seems to have no bad effects upon the Indians ; yet we should be cautious of making too free with it at first, for when Lionel Wafer was at a small island in the South Sea, where the tree grew in plenty, some of his men were so delighted with it, that at parting they were resolved to drink their fill, which they did ; but their appetites had like to have cost them their lives, for though they were not drunk, yet they were so chilled and benumbed, that they could not stand, and were obliged to be carried aboard by those who had more prudence than themselves, and it was many days before they recovered. The shells of these nuts being hard, and capable of receiving a polish, are often cut transversely, when, being mounted on stands, and having their edges silvered or gilt, or otherwise ornamented, they serve the purpose of drinking cups. The leaves of the tree are used for thatching, for brooms, baskets, and other utensils ; and of the reticular web growing at their base the Indian women make cauls and aprons.

NUTS. There are several kinds of nuts used as articles of diet ; but they are not in general to be much recommended. They abound in oily matter, are viscid and glutinous, and are apt with many people to prove very difficult of digestion. Dr. Paris thinks it would be wise to banish nuts from our tables, for there is a fascination in them, which will lead most persons who begin to eat them, to take a quantity which the best disposed stomach cannot bear with impunity. Hoffman observes, that dysenteric complaints are always more common in those years in which the harvest of nuts is plentiful ; and there is not a physician in any practice who will be inclined to doubt his statement.

NUTMEG. In natural history, the kernel of a large fruit, not unlike the peach, the produce of a tree called by botanists *Myristica*. The nutmeg is separated from its investient coat, the mace, before it is sent over to us ; except that the whole fruit is sometimes imported in preserve, by way of sweetmeat, or as a curiosity. The nutmeg, as we receive it, is of a roundish or oval figure, of a tolerably compact and firm texture, but easily cut with a knife, and falling to pieces on a smart blow. Its surface is not smooth, but furrowed with a number of wrinkles, running in various directions, though principally longitudinally. It is of a grayish brown color on the outside, and of a beautiful variegated hue within, being marbled with brown and yellow variegations, running in perfect irregularity through its whole substance. It is very unctuous and fatty to the touch, when powdered, and is of an extremely agreeable smell, and of an aromatic taste, without the heat that attends that kind of flavor in most of the other species. The largest, heaviest, and most unctuous of the nutmegs to be chosen ; such are in shape of an olive, and of the most fragrant smell.

NUTRITION. In Physiology, a function common to all organized bodies, in which their various component tissues convert nutritive matter into their own substance and add it to the particles which previously entered into their composition. The materials of nutrition are prepared by several previous processes; by digestion, in which the food is altered in its qualities, and reduced to a homogeneous mass; by absorption, in which this nutritive part of the aliment is extracted and conveyed into the blood; by circulation and respiration, in which this nutritive matter is converted into blood. Nutrition is the completion of the functions of assimilation; the aliment, animalised by the series of processes just enumerated, and rendered similar to the substance of the being which it is to nourish, is applied to the organs, whose waste it is to repair; and this identification of the nutritive matter to our organs, which take it up, and appropriate it to themselves, constitutes nutrition, in which there is a real conversion of the aliment into our own substance.

The component particles of an animal body are in a state of constant change; the old ones are detached and removed by the absorbents, and their place is supplied by new matter laid down by the arteries. Until the body has attained its full size, the movement of composition predominates over that of decomposition, and all the parts increase; when the growth is completed, and there is no apparent change of bulk, they are moved and the added portions balance each other; and, as the body declines, the absorption exceeds the addition of new matter. But, at all times, there is an interior motion of the component parts. Hence the body has been compared by a French physiologist to the vessel of the Argonauts, so often repaired in the course of a long and perilous navigation, that on her return, no part of her former materials remained.

An animal body probably contains none of the same molecules at two distant periods. The experiments performed by mixing madder with the food of animals, prove most unquestionably this incessant decomposition of animated and living matter. This mixture, in consequence of a chemical affinity between the madder and phosphate of lime, dyes all the bones of a red color; when the madder is left off for a sufficient length of time, the color disappears. It is obvious, that the calcareous phosphate in the osseous system previous to the commencement of the experiment, must be gradually removed, and its place supplied by the colored earth; while this is again absorbed in its turn, after the madder is discontinued, to make room for a new uncolored deposition. If the hardest and most solid parts, apparently the most calculated to resist decay, are undergoing perpetual motion of decomposition and regeneration; there can be little doubt that this motion must be far more rapid in those, whose power of cohesion is much inferior; for example, in the fluids. In the nails, hair, and cuticle, a constant growth is so regularly observed, that it is not ne-

cessary to particularise the phenomena. The fact is not so apparent in the soft parts, although we cannot doubt of its existence.

OAK. Among the most useful of the productions of temperate climates are the different species of oak, truly the pride of the northern hemisphere, to which part of the globe they are almost exclusively confined, with the exception of a few on the mountainous parts of the equatorial regions. They are shrubs, or trees, many of them of the largest size. More than eighty species are known, of which one half inhabit North America, either within the territory of the United States, or on the mountains of Mexico. Among the various uses to which the wood is applied, the most important is ship building. The European oak is tougher and more durable than our own; but if the American vessels are more liable to decay than the European, it is more owing to the timber not being thoroughly seasoned, than to any other cause. In Europe, it is usual, after stripping the oak of its bark, to leave it standing for three or four years before it is cut for use. The European oak, which is most common there, and is so highly prized for its wood, has leaves resembling those of our white oak, and it attains a height of from sixty to one hundred feet, with a trunk six to twelve feet or more in circumference.

Previous to the introduction of mahogany, oak was much used for furniture. Old specimens produce a very beautiful effect when carved, as may be seen in many of the large and ancient European mansions as well as churches. Some of those specimens denote a magnificent size attained by the tree, as well as a beautiful texture. In Dudley Castle there is, or was, an oak table seventy-five feet long and three feet wide, formed from one plank; and at Goodrich Castle is an oak beam sixty-six feet long by two feet square its whole length. The mainmast of the Royal Sovereign, built in the reign of Charles I., was ninety-nine feet long by three feet diameter at the lower end, and formed out of one piece of oak. These samples will give an idea of the size to which the oak in Europe has attained. The quantity of this timber used, especially in ship-building, is as wonderful as the magnitude of the trees. It is said that fifty acres of oak plantation are required to produce the timber for a seventy-four gun ship; and that when the British Royal Navy was the largest, say in the early part of the present century, the ships composing it contained in their structure more than eleven hundred thousand loads of oak.

OAK BARK. The bark of the oak, which is very useful in tanning. The bark of oak trees was formerly thought to be extremely useful in vegetation. One load, Mr. Mills in his Treatise on Husbandry informs us, of oak bark, laid in a heap and rotted, after the tanners have used it for dressing of leather, will do more service to stiffen cold land, and its effects will last longer than two loads of the richest dung; but this has been strenuously controverted. The bark, in medicine, is also a strong astringent; and hence is recom-

mended in hæmorrhages, alvine fluxes, and other preternatural or immoderate secretions; and in these it is sometimes attended with good effects. Some have alleged that by the use of this bark every purpose can be answered which may be obtained from Peruvian bark. But, after several very fair trials, this is found not to be the case. Besides the bark, the buds, the acorns, and their cups are used; as also the galls, which are excrescences, caused by insects, on the oaks of the eastern countries, of which there are divers sorts; some perfectly round and smooth, some rougher with small protuberances, but all generally having a round hole in them.

OAR. A long piece of timber, flat at one end, and round or square at the other, used to make a vessel advance upon the water. The flat part, which is dipped into the water, is called the blade, and that which is within the board is termed the loom, whose extremity, being small enough to be grasped by the rowers, is called the handle. To push the boat or vessel forwards by means of this instrument, the rowers turn their backs forwards, and, dipping the blade of the oar in the water, pull the handle forward, so that the blade, at the same time, may move aft in the water. But since the blade cannot be so moved without striking the water, this impulsion is the same as if the water were to strike the blade from the stern towards the head; the vessel is therefore necessarily moved according to the direction. Hence it follows, that she will advance with greater rapidity, by as much as the oar strikes the water more forcibly; consequently, an oar acts upon the side of a boat or vessel like a lever of the second class, whose fulcrum is the station upon which the oar rests on the boat's gunwale.

OATS. The great use of oats, and the ease with which they are raised on almost every kind of soil, from the heaviest loam to the lightest sand, have made them occupy a place in almost every rotation of crops. It is said that the best oats are raised in Scotland and Friesland. The average yield on good soils is from thirty to forty bushels per acre, and on the richest soils when well cultivated, the produce has been over one hundred bushels to the acre. The oat is exposed to fewer injuries than other grain, being seldom affected by rust, smut, or insects. It succeeds best in cold and moist countries. The meal is nutritious, and, in some countries, forms an important article of food, for instance in Ireland particularly; but the bread made of it is rather indifferent in quality, and somewhat bitter. Beer is made from this grain in Britain and Poland; and it is besides distilled to procure ardent spirits. Oats are the best food for horses, and for this purpose, in our own country, are principally cultivated.

OIL STONE. In Natural History, is a stone of a whitish color, with a faint mixture of a bluish grey; and it is sometimes ornamented with black spots and dendritæ. It is of a moderately fine and compact texture, hard and heavy, and capable of a tolerable polish.

It is not acted upon by acids, gives fire very freely with steel, and when burnt, acquires a pure white color. This stone has not yet been found in England ; but in the eastern parts, and in Germany, there are large strata of it. It is much used by our artificers for setting a fine edge on their tools, and is only used with oil, which by degrees changes its color to a deep brown.

OLIVE OIL. This is prepared from the fruit of the olive when fully ripe, by pressing it gently ; it then yields the purest oil, but an inferior kind is procured by heating the remainder, and squeezing the fruit more strongly. Olive oil enters largely into the diet of many nations, and is much used in medicine and pharmacy. When good, it is of a pale yellow color, of a bland taste, and without smell ; when long kept, it becomes rancid. When taken internally, it acts as a mild laxative, but not many stomachs can retain enough for this purpose. It is sometimes given in pretty large doses for the expulsion of worms, particularly some kinds of *tænia* or tapeworm. And it may also be given internally in small doses, with mucilage and other additions, as an emulsion in cases of catarrh and sore throat. In cases where certain poisons have been swallowed, large quantities of oil are given to correct the acrimony of the substance swallowed. When applied externally, it acts as an emolient, and forms a good medium for frictions which are designed to promote absorption, and to discuss indolent swellings. Warm oil rubbed on the belly, gives much relief in dysentery and other abdominal complaints ; and the same application is one of the best means for dispersing the knots in the breasts of childbed women, in the first days of their confinement. Olive oil is an ingredient in many plasters and ointments. Combined with hartshorn, it forms the volatile liniment, so useful as an external stimulant. Some have said that anointing the body with oil prevents a person from receiving the infection of the plague.

OLIVE TREE. The olive tree, in all ages, has been greatly celebrated, and held in peculiar estimation, as the bounteous gift of heaven ; it was formerly exhibited in the religious ceremonies of the Jews, and is still considered as emblematic of peace and plenty. The utility of the fruit is very extensive. Pickled olives, which are of two kinds, Spanish and French, are extremely grateful to many stomachs, and said to excite appetite and promote digestion ; they are prepared from the green unripe fruit, which is repeatedly steeped in water, to which some quicklime or alkaline salt is added, in order to shorten the operation ; after this they are washed and preserved in a pickle of common salt and water, to which an aromatic is sometimes added. The principal consumption, however, of this fruit, is in the preparation of the common salad oil, which is obtained by grinding and pressing them when thoroughly ripe ; the finer and purer oil issues first by gentle pressure, and the inferior sorts on heating what is left, and pressing it more strongly. The best olive oil is of a bright

pale amber color, bland to the taste, and without any smell ; it becomes rancid by age, and sooner if kept in a warm situation.

With regard to its utility, oil, in some shape, forms a considerable part of our food, both animal and vegetable, and affords much nourishment. With some, however, oily substances do not unite with the contents of the stomach, and are frequently brought up by eructation ; this happens more especially to those whose stomachs abound with acid. Oil, considered as a medicine, is supposed to correct acrimony, and to lubricate and relax the fibres ; and therefore has been recommended internally, to obviate the effects of various stimuli, which produce irritation, and consequent inflammation ; on this ground it has generally been prescribed in coughs, catarrhal affections, and erosions. Oil rubbed over the body is said to be of great service in dropsies, particularly ascites. Olive oil enters several officinal compositions, and when united with water, by the intervention of alkali, is usually given in coughs and hoarsenesses.

ONIONS. Of the several varieties of onions, the yellow or silver skinned, and the large red, are the best for a general crop. The bulbs are handsome, of firm growth, and keep well through the winter. The New England white are handsome for the table, and are very suitable for pickling, as well as to pull when quite young, and generally prove a very profitable crop. The admirable Portuguese onions are only raised in perfection near the seashore, in places moistened by the tide ; hence moisture and a little salt should be secured to the growing plants. It is a well established fact, that the mild or strong qualities of the onion depend more on climate and cultivation than on any inherent property of it ; as those grown in Spain, Portugal, Madeira, and Teneriffe, are more benignant in their flavor than those cultivated in the northern parts of Europe or of the United States. And the inhabitants of the warmer climates, as in the tropics, requiring their meats and soups highly seasoned, prefer onions of the strongest flavor ; while those of more temperate and colder regions, who more frequently eat them served up with melted butter or white sauce, seek the opposite property, mild and sweet.

The onion is supposed to be a native of Spain, yet that is not an established fact. The history of its culture is not fully known. This, however is known, that wherever the ground is duly prepared, and the cultivation is properly observed, the crop is highly profitable. They require a rich friable soil ; a situation enjoying the full influence of the sun, and entirely free from trees, which are very inimical to them. If the soil be poor, or exhausted, abundance of dung should be applied in the preceding autumn or winter, and the ground thrown into ridges. By these means it becomes well decomposed and incorporated with the soil ; for rank, un-reduced dung, is generally injurious to the crop. If, therefore, the application of manure is neglected until spring, it should be taken from an old hot-bed, or other source whence

it is to be had, in a thoroughly putrescent state, and turned in only to a moderate depth. A dressing also of gypsum, soot, and wood ashes is favorable to the growth of onions; and we have found neither better than finely decomposed hen-dung.

OPHIR. In Sacred Geography, the place from which Solomon procured the gold and other precious articles with which he enriched himself, and adorned the temple of Jerusalem. Concerning the part of the world in which Ophir was situated, there have been many and various opinions and conjectures; some of them extremely fanciful, not to say absurd; and others supported and elucidated with no inconsiderable portion of ingenuity and learning; still, however, the exact situation of this place is undetermined, though the opinion that it was somewhere either on the eastern or western coast of Africa seems the most plausible, and to obtain the sanction of the most learned and well informed writers, who have discussed or adverted to this point of sacred geography.

OPTICS. Optics is the science which treats of light, and of the instruments by which it is applied to useful purposes. It is one of the most interesting branches of natural philosophy, but not one of the easiest to understand; it will be necessary, therefore, that you give to it the whole of your attention. Light, when emanated from the sun, or any other luminous body, is projected forwards in straight lines in every possible direction; so that the luminous body is not only the centre from whence all the rays proceed, but every point of it may be considered as a centre which radiates light in every direction. The particles of light are so extremely minute, that although they are projected in different directions, and cross each other, yet they are never known to interfere, and impede each other's course. It is still a disputed point, however, whether light be a substance composed of particles like other bodies. In some respects, it is obedient to the laws which govern bodies; in others, it appears to be independent of them: thus, though its course is guided by the laws of motion, it does not seem to be influenced by the laws of gravity. It has never been discovered to have weight, though a variety of interesting experiments have been made with a view of ascertaining that point. Some suppose that the rays of light, instead of being particles, consist of the undulations of an elastic medium, which fills all space, and which produces the sensation of light to the eye, just as the vibrations of the air produce the sensation of sound to the ear. Most of the phenomena may be accounted for by either hypothesis, but that of their being particles applies more happily to some of the facts respecting the modifications of light by refraction and reflection.

OPIUM. In chemistry and medicine, an inspissated gummy juice, which is obtained from the head of the "papaver somniferum." It is imported from Persia, Arabia, and other warm parts of Asia, in flat cakes, covered with leaves, to prevent their sticking together. It has

a reddish brown color, and strong peculiar smell : its taste at first is nauseous and bitter, but this soon becomes acrid, and produces a slight warmth in the mouth. A peculiar substance has been detected in opium, to which it is supposed the properties it possesses of producing sleep are owing. On account of this property, this substance has received the name of narcotic matter. It is obtained from the milky juices of some plants, as those of the poppy, lettuce, and some others. Opium, which is extracted from the poppy, is prepared by the following process : The heads of the white poppy, which is cultivated in different countries of the east for this purpose, are wounded with a sharp instrument : a milky juice flows out, which concretes, and is collected and formed into cakes. In this state opium is a tenacious substance, of a brownish color ; has a peculiar smell, and a disagreeable bitter taste. It becomes soft with a moderate heat. It readily takes fire, and burns rapidly.

ORANG OUTANG. Cuvier thus describes this animal. The average height of the species is from three to four feet. The body is covered with coarse red hairs. The forehead equals in height one-half of the rest of the visage. The face is bluish. There are neither pouches in the cheeks, nor callosities on the posteriors. The hinder thumbs are remarkably short. This celebrated ape resembles man more nearly than any other animal, in the form of the head and the volume of the brain. The natural history of the orang outang has been miserably disfigured by the mixture of it with that of other apes of the larger size, more especially with that of the Chimpanse. Upon a critical examination, it is ascertained that he inhabits the most oriental countries only, as Malacca, Cochin China, and particularly the great island of Borneo, whence he has been brought to Europe by way of Java, though but rarely. He is gentle, easily tamed, and capable of attachment. From the character of his physical conformation, he can arrive at some facility in the imitation of several human actions ; but his intelligence by no means equals the exaggerated accounts we have received of it, nor does it appear to surpass much that of the canine species. Camper has discovered and ably described two membranous sacks, which produce a thickness and hoarseness in the voice ; but he was wrong in believing that the nails are always wanting on the hinder thumbs.

ORANGE. A low, evergreen, branching tree, bearing oblong oval, acute, smooth and shining leaves, inserted on winged leaf stalks, by which character it is easily distinguished from the lemon. The flowers are white, containing about twenty stamens, and are disposed in clusters of from two to six upon a common peduncle. The fruit is globose, bright yellow, and contains a pulp, which consists of a collection of oblong vesicles, filled with a sugary and refreshing juice : it is, besides, divided into eight or ten compartments, each containing several seeds. The principal varieties are the sweet or China, and

the bitter or Seville orange ; the Maltese orange is also deserving of notice, from its red pulp. Though now extensively cultivated in the south of Europe, the introduction of the orange is of modern date, and it was unknown in that continent till about the beginning of the fifteenth century. At the present time, it forms an extensive branch of commerce between the Mediterranean and the more northern countries. It is exceedingly long lived, and is still esteemed young at the age of a century. An essential oil is obtained from the flowers, which is hardly less esteemed than the celebrated ottar of roses.

Bergamot is a well known perfume, obtained from the rind of a variety of the orange, and has received the name from the town of Bergamo, in Italy, where this variety is much cultivated. The wood of this tree is fine grained, compact, susceptible of a fine polish, and is employed in the arts. The orange, together with the lemon, citron, lime, shaddock, and indeed almost the entire family aurantiaceæ, is a native of tropical Asia and the East Indies. A singular exception is found in our own country : a species of orange, bearing fruit of a very agreeable flavor, is extremely abundant in East Florida, and, according to the testimony of scientific travellers, is undoubtedly native : it has not, however, been accurately compared with other species, and, what is more remarkable, although mentioned by early travellers, has not hitherto found its way into systematic works on our botany.

ORES. Metals, when found in a state of combination with other substances, have the name of ores. They are in general deposited in veins of various thickness, and at various depths in the earth. The mode of obtaining them is to penetrate from the surface of the earth to the vein, and then to follow it in whatever direction it may lie. The hollow places thus formed are called mines, and the men employed in them are denominated miners. When the veins are at a great depth, or extend to any considerable distance beneath the surface of the earth, it is necessary, at intervals, to make openings, or shafts, to the surface, for the admission and circulation of air ; and also to draw off the water, which collects at the bottom, by means of drains, pumps, or steam engines, as the situation or circumstances require. After the metallic ores are drawn from the mine, they, in general, go through several processes before they are in a state fit for use. Some of these are first washed in running water, to clean them from loose, earthy particles. They are then piled together with combustible substances, and burnt, or roasted, for the purpose of ridding them of the sulphur or arsenic with which they may happen to be combined, and which rises from them in a state of fume or smoke. Thus having been freed from impurities, they undergo the operation of melting, in furnaces constructed according to the nature of the respective metals, or the uses to which they are subsequently applied.

ORGANIC REMAINS. A name applied to all those animal and vegetable substances which have been dug out of the earth in a

mineralized state, and serve as strong evidences of the universal deluge, and the changes which ensued. They also afford reason to believe that the matter composing the solid parts of the globe, has undergone violent and extensive revolutions, and that whole classes of vegetables and animals now extinct, have existed on the globe, anterior to the present constitution of things.

ORNITHOLOGY. That branch of natural history which considers and describes birds, their natures and kinds, their form, external and internal, and teaches their economy and uses ; also, the several orders and genera in the alphabetical order. Birds are divided, according to the form of their bills, into six orders, viz : Accipitres, as eagles, vultures, and hawks : Picæ, as crows, jackdaws, humming-birds, and parrots : Anseres, as ducks, geese, swans, gulls : Grallæ, as herons, woodcocks, and ostriches : Gallinæ, as peacocks, pheasants, turkies, and common fowls : and Passeres, comprehending sparrows, larks, swallows, &c.

Birds are distinguished from quadrupeds, by their laying eggs : they are generally feathered ; some few are hairy, and instead of hands or fore-legs, they have wings. Their eggs are covered by a calcareous shell, and they consist of a white, or albumen, which first nourishes the chick during incubation ; and a yolk, which is so suspended within it as to preserve the side on which the little rudiment of the chicken is situated continually uppermost, and next to the mother that is sitting upon it. The yolk is in great measure received into the abdomen of the chicken, a little before the time of its being hatched, and serves for its support, like the milk of a quadruped, and like the cotyledons of young plants, until the system is become sufficiently strong for extracting its own food out of the ordinary nutriment of the species.

OSTRICH. The ostrich is a bird very anciently known, since it is mentioned in the oldest of books. It has furnished the sacred writers with some of their most beautiful imagery ; and its flesh was, even previous to the days of Moses, apparently a common species of food, since we find it interdicted, among other unclean animals, by the Jewish legislator. The ostrich is generally considered as the largest of birds, but its size serves to deprive it of the principal excellence of this class of animals, the power of flying. The medium weight of this bird, may be estimated at seventy-five or eighty pounds, a weight which would require an immense power of wing to elevate into the atmosphere. The head and bill of the ostrich somewhat resemble those of a duck ; and the neck may be compared to that of a swan, but that it is much longer ; the legs and thighs resemble those of a hen ; though the whole appearance at a distance bears a strong resemblance to that of a camel ; it is usually seven feet high from the top of the head to the ground, but from the back it is only four ; so that the head and neck are above three feet long. Some reach the height of nine feet. From the top of the head to the rump, when the neck is stretched out in a right line, it is six feet long, and the tail is about a foot more.

One of the wings, without the feathers, is a foot and a half ; and being stretched out, with the feathers, is three feet. The plumage is much alike in all ; that is, generally black and white ; though some of them are said to be gray. The greatest feathers are at the extremities of the wings and tail, and the largest are generally white. The next row is black and white : and of the small feathers on the back and belly, some are white and others black. There are no feathers on the sides, nor yet on the thighs, nor under the wings. The lower part of the neck, about half way, is covered with still smaller feathers than those on the belly and back ; and those, like the former, also are of different colors. The head and upper part of the neck are covered with hair.

The season for laying depends on the climate ; in the northern parts of Africa it is about the beginning of July ; in the south it is about the latter end of December. These birds are very prolific, and lay generally from thirty to forty eggs in a season, and about twelve at one clutch. It has been commonly reported that the female deposits them in the sand ; and, covering them up, leaves them to be hatched by the heat of the climate, and then permits the young to shift for themselves. Very little of this, however, is true : no bird has a stronger affection for her young than the ostrich, and none watches her eggs with greater assiduity. It happens, indeed, in those hot climates, that there is less necessity for the continual incubation of the female ; and she more frequently leaves her eggs, which are in no fear of being chilled by the weather : but though she sometimes forsakes them by day, she always carefully broods over them by night ; nor is it more true that they forsake their young after they are excluded the shell. On the contrary, the young ones are not even able to walk for several days after they are hatched. During this time the old ones are very assiduous in supplying them with grass, and very careful to defend them from danger ; nay, they encounter every danger in their defence.

OTTAR OF ROSES. An aromatic oil, obtained from the flowers of the rose, but in such small quantities that half an ounce can hardly be procured from a hundred pounds of the petals. This oil is solid and white at the common temperature of the atmosphere, but on the application of heat, becomes fluid, and assumes a yellow color. It is brought in considerable quantities from Turkey, and is sold at the extravagant price of from fifteen to twenty dollars an ounce. That from the East Indies, where it is said to be chiefly manufactured, when genuine, has been sold at a much more exorbitant price. It is frequently adulterated with oil of sandal wood, but the fraud is easily detected by those who are accustomed to its scent, and also by the fluidity. The true ottar of roses is, undoubtedly, the most elegant perfume known.

OTTER. The American otter is about five feet in length, in-

cluding the tail, the length of which is eighteen inches. The color of the whole body, except the chin and throat, which are dusky white, is a glossy brown. The fur throughout is dense and fine. This otter inhabits South, as well as various parts of North America, along the fresh water streams and lakes, as far north as to the Coppermine river. In the Southern, Middle, and Eastern States of the Union, they are comparatively scarce, but in the Western States they are in many places still found in considerable numbers. On the tributaries of the Missouri, they are very common; but it is in the Hudson's Bay possessions that these animals are obtained in the greatest abundance, and supply the traders with the largest number of their valuable skins. Seventeen thousand and three hundred otter skins have been sent to England in one year, by the Hudson's Bay Company.

Nature appears to have intended the otter for one among her efficient checks upon the increase of the finny tribes, and every peculiarity in its conformation, seems to have this great object in view. The length of body, short and flat head, abbreviated ears, dense and close fur, flattened tail, and disproportionately short legs, with webbed feet, all conspire to facilitate the otter's movements through the water. In the crystal depths of the river, few fish can elude this swiftly moving and destructive animal, which unites to the qualities enabling him to swim with fish-like celerity and ease, the peculiar sagaciousness of a class of beings far superior in the intellectual scale to the proper tenants of the flood. In vain does the pike scud before his pursuer, and spring into the air in eagerness to escape; or the trout part with the velocity of thought from shelter; in vain does the strong and supple eel seek the protection of the shelving bank or the tangled ooze in the bed of the stream; the otter supplies by perseverance what may be wanting in swiftness, and by cunning where he is deficient in strength, and his affrighted victims, though they may for a short time delay, cannot avoid their fate. When once his prey is seized, a single effort of his powerful jaws is sufficient to render its struggles unavailing; one crush with his teeth breaks the spine of the fish behind the dorsal fin, and deprives it of the ability to direct its motions, even if it still retain the least power to move.

OUNCE. A little weight, the sixteenth part of a pound avoirdupoise, and the twelfth part of a pound troy: the ounce avoirdupoise is divided into eight drams, and the ounce troy into twenty pennyweights. The avoirdupoise ounce is less than the troy ounce, but the avoirdupoise pound is greater than the troy pound. One hundred and seventy-five troy ounces are equal to one hundred and ninety-two avoirdupoise ounces: but one hundred and forty-four pounds avoirdupoise are equal to one hundred and seventy-five pounds troy. Therefore one pound avoirdupoise, is equal to one pound, two ounces, eleven pennyweights, sixteen grains troy.

OXYGEN. Oxygen is one of the most important agents in na-

ture ; there is scarcely a single process, either natural or artificial, in which oxygen has not a share, but it is known only in combination with other bodies. It forms nearly or quite half of the material of our globe. Of every nine pounds of water, eight pounds are oxygen. Of air it forms the one-fifth part. Of the solid ground, nearly one-half is oxygen ; but to make an estimate correctly we must look at the several minerals composing the earth, and then, knowing the amount of oxygen in each one of these, we may have an idea of its amount in the whole. Silica and alumina are more abundant than all the others together ; the former is composed, 24 parts of oxygen, and 22 of silicon, the latter of 24 of oxygen and 27 of aluminum. Water is an important constituent of nearly all minerals, and being mainly composed of oxygen, it helps to enlarge our estimate of the vast amount of this element in the formation of our planet. But its importance is not more conspicuous in its amount than in the part it acts in the animal and vegetable world. Every grown up person consumes 150 cubic feet of it in his lungs daily. It unites with the carbon of our bodies, and then we exhale it as carbonic acid gas. How constantly are our lives dependent upon it ! If deprived of it from three to five minutes, our lives are extinct. Drowning causes death simply by depriving us of oxygen. Strangling or choking instantly causes death in the same way.

When we think of how much oxygen is daily consumed by the 800,000,000 people of our earth, by all the myriads of animals, and by all the fires for warming, cooking, and manufacturing purposes, we are astonished at its vast daily consumption ! How shall the air receive a new supply ? Only from the leaves of plants ! They imbibe carbonic acid in the leaves, decompose it, take the carbonic for building up their structures, and give out the oxygen for the support of men and animals. We are just as much dependent upon plants for the air we breathe as for our food and clothing. And plants are equally as dependent on animals for their necessary supplies of carbonic acid. Plants have this power of absorbing carbonic acid and giving out oxygen only through the influence of the yellow rays of sunlight. At night this mysterious process does not go on, and if with a prism we decompose the rays of the sun, we find that in the yellow rays alone they give out oxygen. Here we see the dependence of one part of creation upon another, and how in fact the whole fabric of the known universe is a unity ! No science is complete in itself alone, because no department of creation is disconnected with the other parts. All are most intimately interwoven, and their greatest beauty and grandeur is seen in their connections and their harmonious operations. Creation is a great machine—no portion of it is for an instant at rest. And among all these motions not one is independent. Each is caused by the other in a mazy round, and the grand Power

which originally started the whole, and now sustains and guides it, is God !

In all the arts oxygen acts as important a part as in the natural world. The smelting of iron, zinc, copper, lead, and mercury, is done by oxygen operations. Ink blackens after writing on paper by imbibing oxygen from the air ; cider turns to vinegar from the same cause, and so butter becomes rancid, oil thickens, and dough sours if it be not baked soon enough. Oil mixed with paint makes it hold on ; it imbibes oxygen from the air and turns into a solid gum, which is smooth and glossy. If a house be painted in extremely hot weather, the oil evaporates and flies away, and does not harden on the boards or bricks to keep on the paint. Often the parlors of fine houses are painted white with the air kept out as much as possible while the operation is going on and until it is dry—even the keyholes of the doors are shut up. This keeps out the oxygen to some extent, and prevents it from uniting much with the oil or turpentine of the paint, and from turning into gum. Hence such rooms have a chalky, milky whiteness, and no shining gloss, but the work is most deleterious to the health of the painter. The making of varnish is a process for uniting the oxygen of the air with oil, spirits of turpentine, and various gums.

The rusting of metals is but the union of oxygen with their surfaces. Dampness hastens the rusting because of the oxygen dissolved in the water. In sickness the death of men and animals is hastened by the same cause. Even when we are unable to take food, the oxygen we breathe unites with our systems, and carries them off little by little ; soon we become very thin and light, and the vital organs give way. Cooked meats and vegetables are preserved many years when shut up away from the oxygen in tin cans that are air tight. Winter apples that keep so long have a peculiar gum in the skin which prevents the entering of the oxygen. Eggs are said to keep long if covered with a thin coating of wax which protects them from this destructive gas. Meats after being smoked remain sweet a long time, because the creosote of the smoke unites with the albumen of the meat and forms an impervious coating which the oxygen cannot penetrate.

PAIRING. In the animal economy this is the union of animals in couples for the purposes of rearing their young. All wild birds pair ; but with a remarkable difference between such as place their nests on trees and such as place them on the ground. The young of the former, being hatched blind and without feathers, require the nursing care of both parents till they are able to fly. The male feeds his mate on the nest, and cheers her with a song. As soon as the young are hatched, singing yields to a more necessary occupation, that of providing food for a numerous issue ; a task that employs both parents. Eagles, and other birds of prey, build on trees, or on other

inaccessable spots. They not only pair, but continue in pairs all the year round; and the same pair procreates year after year. This at least is the case with the eagles; the male and female hunt together, unless during incubation, at which time the female is fed by the male. A greater number than a single pair are never seen in company. Gregarious birds pair, probably to prevent discord in a society confined to a narrow space. This is the case particularly with pigeons and rooks. The male and female sit on the eggs alternately, and divide the care of feeding their young. Eider ducks pair like other birds that place their nests on the ground; and the female finishes her nest with down, plucked from her own breast. If the nest is destroyed for the down, which is remarkably warm and elastic, she makes another nest as before. If she is robbed a second time, she makes a third nest; but the male furnishes the down. The black game never pair; in spring, the cock, on an eminence, crows and claps his wings; and the females within hearing resort to him.

Pairing birds, excepting those of prey, flock together in February to choose their mates. They soon disperse; and are not seen afterwards but in pairs. Pairing is unknown to quadrupeds that feed on grass. To such it would be useless; as the female gives suck to her young while she herself is feeding. Beasts of prey, such as lions, tigers, wolves, pair not. The female is left to shift for herself and for her young; which is a laborious task, and often so unsuccessful as to shorten the lives of many of them. Pairing is essential to birds of prey, because incubation leaves the female no sufficient time to hunt for food. Pairing is not necessary to beasts of prey, because their young can bear a long fast. Among animals that pair not, males fight desperately for a female. The beavers, with respect to pairing, resemble birds that place their nests on the ground. As soon as the young are produced, the males abandon their stock of food to their mates and live at large; but return frequently to visit them while they are suckling their young. Hedgehogs pair, as well as several of the monkey kind. We are not well acquainted with the natural history of these animals; but it would appear that the young require the nursing care of both parents. Seals have a singular economy. Polygamy seems to be a law of nature among them, as a male associates with several females. The sea turtles have no occasion to pair, as the female performs her task at once, by laying her eggs in the sand. The young are hatched by the sun, and immediately crawl to the sea.

PALMS. A natural family of plants, the pride of tropical climates, and which, more than any other, contributes to give a peculiar and imposing character to the vegetation of those regions. Their lofty, straight and unbranching trunks, crowned at the summit by a tuft of large radiating leaves, give them an aspect entirely unique, and far surpassing that of other trees in majesty. Aside from the

grandeur of their appearance, many of them hardly yield to any other vegetables in useful properties. The species are numerous, but are not well understood; and many fruits exist in collections which cannot be referred to known genera.

The stem is simple, or very rarely branching, and is sustained by a mass of fibrous roots at the base. Though usually attaining the stature of a tree, and sometimes ascending to a very great height, in some species the stem rises only a few inches above the surface of the ground. This stem is cylindrical, but, internally, the fibres are arranged in fascicles, and not in concentric circles, as with trees generally. The centre is soft, while the circumference is firm and hard like horn. In these respects, the palms are analogous to other monocotyledonous vegetables. This stem is covered externally with the sheaths of the fallen leaves, or with their cicatrices, and is terminated by a tuft of pinnate or flabelliform leaves. From the midst of these arises a simple or branching spadix, on which the numerous small flowers are disposed, and which at first is enveloped in one or several spathæ, or sheaths. Many of the palms appear to be confined within narrow limits, and it has been remarked that, whenever a district is characterized by striking peculiarities of soil or climate, it appears to be inhabited by peculiar species. All the palms are not strictly confined within the tropics, but a few inhabit the warm regions on their borders. Five species are found in the United States; of these, the palmetto, or cabbage tree, extends along the Atlantic coast as far as north latitude thirty-five degrees; the others are dwarfs and are confined to more southern latitudes. Among the more useful of the palms may be mentioned the cocoa-nut, the sago and the date.

PARADISE, BIRD OF. The great beauty of this bird's plumage, and the deformity of its legs, have been the means of giving rise to a variety of fabulous tales. The savage inhabitants of the Molucca Islands, of which the bird of paradise is a native, perceiving the eagerness with which the Europeans purchased this favorite bird, resolved to make it appear different from any other of the feathered race; and, by cutting off the legs with some degree of ingenuity, asserted that it lived wholly in the air; and this improbable invention was actually believed. Of this bird there are two kinds, the most common of which is about the size of a pigeon, and the other not larger than a lark; the head, throat, and neck, are of a pale gold color, though the hinder part of the former is of a shining green; the body and wings are a beautiful brown, intermixed with purple and gold; the upper part of the tail feathers are a pale yellow, but the under ones, which are longer, are a delicate white. Yet, what chiefly excites the observation of the curious, are two long naked feathers, which spring from the upper part of the back, near the tail; these feathers are usually three feet in length, bearded only at the

beginning and end ; the shaft of which is a deep black, but the feathered part is changeable, like the mallard's neck.



BIRD OF PARADISE.

These birds, which for beauty exceed all others of the pie kind, associate in large flocks in the Molucca Isles ; but, in the Island of Aro, they are still more abundantly found ; and, as the country where they breed has its tempestuous seasons, when rains and thunder continually disturb the atmosphere, they are supposed at those periods to seek a more tranquil clime, and are never seen in the air until it becomes composed. The natives, who make a trade of killing and selling the bird of paradise to Europeans, hide themselves in those trees to which

they resort, and contrive to conceal their persons, by forming a bower of the branches which are over their heads, from which they shoot at their prey with reedy arrows, that only slightly damage the beauty of their plumes; they then take out every part of their entrails, and run a hot iron up their body, which dries up the juice; and, after filling them with salts and spice, they offer them for public sale. It is asserted by the natives, that each flock of these curious birds is under the dominion of one, that is considered as king, and that this is distinguished by a peculiar brilliance of plumage, which the natives themselves can easily discern; and if the fowlers are able to destroy their monarch, the rest of the flock quickly become their prey.

PARASOL. It appears from ancient monuments and descriptions that this well known instrument, or something exceedingly resembling it, was used among the ancients, not for the purpose so much of preservation from the rays of the sun as in religious ceremonies and processions. In the festivals of Ceres and Minerva, the young females who celebrated them bore, among other sacred instruments, the parasol; it was, in fact, one of the most ancient marks of dignity that we find indicated either by relics of arts or by authors. In process of time, when the Romans began to lay aside the simple habits of their forefathers, the parasol, by a natural transition, began to be used for the purpose to which it is still applied. The matrons, particularly, used to be followed by slaves, whose office was to protect the delicacy of their charms by intercepting the solar heat by the agreeable shade of the parasols. They were constructed of wands, or twigs, disposed in such a manner as to admit of their being put up or down, in much the same way as those used at the present day. The substance employed, was often of rich stuff, such as silk, of showy colors, and elegantly embroidered. In many countries, where the sun is powerful, it is well known that parasols are used by men, as well as women.

PARCHMENT. The article called parchment is the skin of the sheep, lamb, pig, or calf, prepared for writing with a pen, or for inscriptions with types or plates used by engravers. When the skin is divested of its hair, or wool, it is placed for some time in a lime pit, and then stretched on a square wooden frame drawn tight by pegs. When in the frame it is first scraped on the flesh side with a blunt iron, then wetted with a moist rag, covered with pounded chalk, and rubbed well with pumice stone. After a short pause these operations are repeated, but without chalk. The skin is then turned, and scraped on the hair side only once. The flesh side is scraped once more, and again rubbed over with chalk. All this being done, and when the skin is well dried, it is removed from the frame and sent to the parchment maker, who with a sharp instrument further prepares the surface for the use to which it is to be applied, by scraping and smoothing it.

PARSNIP. This root is among the most valuable raised in the

garden for family use, and on the farm for stock. What renders it particularly desirable in the family, is its being kept in the ground without injury till spring, when there are but few fresh vegetables that can be had. It is known also that the flavor of the parsnip is improved by remaining in the ground. The customary mode of preparing them for the table is to boil them with meat; this gives additional richness to their juices; and a still further improvement in them is effected, if afterwards cut into slices and fried brown. The slices should be thin, and sometimes, if designed to be very nice, the slices before being fried, are dipped into a batter of flour, butter, and eggs. Parsnips, as well known, are sweet, and in a small degree aromatic, and they contain a moderate percentage of vinous substance. They are sometimes mashed with potatoes and butter and mixed with milk. They also make a kind of marmalade that is by many highly relished.

Of late years the parsnip has been highly commended for field culture, yielding a large crop, and being among the most nutritious of vegetables for most kinds of stock. Some have fattened pork upon it without any other feed; and the pork was of the best quality. Beef is fattened with it, and in the London market such beef is highly prized, and commands the highest price. Dairy cows eat them as readily as they would carrots; and the quantity and quality of the milk are essentially promoted. The butter made from cows fed with parsnips is peculiarly rich. Horses and sheep, too, are not less disposed to feed upon them, and to give evidence that they are conducive to thrift. It is estimated that parsnips may be raised cheaper than potatoes. Twelve hundred bushels have been obtained from a single acre; and with the same degree of culture, in ordinary seasons, not more than three hundred bushels of potatoes could be had from it. They are rarely injured by insects; and they penetrate so deep into the ground as not to be effected by drought. However, they require a rich mellow soil, and in the early part of the season, to be properly thinned out and kept free from weeds.

PARING AND BURNING. This is an operation, in modern agriculture, which consists in cutting a thin slice from the surface of land which is overgrown with grass, heath, fern, or any other plant which form a sward by matting together of their roots. The sods are allowed to dry in the sun, to a certain degree, after which they are arranged in heaps, and burnt slowly, without flame or violent heat. The result is a mixture of burnt earth, charred vegetable fibre, and the ashes of that part which is entirely consumed. The object of this operation is two-fold—first, to kill the insects and destroy useless and noxious weeds completely; and secondly, to obtain a powerful manure, impregnated with alkaline salts and carbonaceous matter, which experience has shown to be a very powerful promoter of vegetation. The instruments by which this is effected, are either a com-

mon plough with a very flat share, which may be used when the surface is very level, without being encumbered with stones or large roots, as in low moist meadows, or in most other cases, a paring iron, used by hand, the cross bars of which are held by both hands ; and the upper parts of the thighs, being protected by two small slips of board, push the instrument into the ground, so as to cut a slice of the required thickness, which is then turned over by moving the cross handle. The labor is severe, and a good workman can scarcely pare more than one-sixth of an acre in a day. This mode of paring and burning is but barely known in our own country.

PARROT. Of all foreign birds, the parrot is best known to us ; it is at once beautiful and docile, and with very little difficulty is taught to speak. A grave writer assures us, that one of these birds, at command, would repeat a whole sonnet from Petrarch ; and a distiller, who had been greatly injured by the malevolence of an informer that lived opposite to him, taught his parrot the ninth commandment, which the bird was continually repeating, to the entertainment of those neighbors who were acquainted with the ungenerous part the despicable man had played. Willoughby tells us that a parrot, belonging to King Henry VII., who then resided at Westminster, in his palace by the Thames, had learned many words from the passengers who took water at that place. One day, sporting on his perch, the poor bird fell into the stream, at the same time calling as loud as he could, "A boat ! twenty pounds for a boat !" A waterman, hearing the cry, made to the place where the parrot was floating, and taking him up, restored him to the king. As it was known the bird was a favorite, the man insisted that he ought to have a reward rather equal to his services than his trouble ; and as the parrot had cried twenty pounds, he said the king was in honor bound to grant it. The king agreed to leave it to the parrot's determination ; which the bird hearing, instantly cried out, "Give the knave a groat."

PASTRY. Pastry, or dough mixed with butter, is used in a great variety of forms, and is grateful to the taste, but injurious to the health. It is a fertile source of all the varieties of stomach complaints, and is apt to occasion plethora and the apoplectic tendency, as well as many skin diseases. At dinner, in the shape of tarts and confectionary, pastry is thrown into the already loaded stomach, and its overtaxed powers are unable to digest what is difficult to manage at its most vigorous times. To children, pastry is peculiarly unsuitable. Its taste is pleasant, and injudicious fondness is apt to indulge them with it ; but those children who use it much, are subject to runnings from the ears, disorders of the bowels, eruptions on the skin, and inflammatory complaints of various kinds. Pastry should be almost totally excluded from the nursery-table.

PASTURES. The land usually appropriated to permanent pasturage, is that which is mountainous or hilly, or encumbered with

large stones, so as not to be susceptible of tillage, or if susceptible, occasioning so much labor, as to render the process inexpedient. Other lands which are habitually cultivated, may be benefited by allowing them for a few years, after a long period of devotion to cropping, to be used as pastures. The soil is made better. The roots of the grass which remain furnish a large amount of organic matter, which, to a soil poor in this constituent, is of great advantage. Land which thus lies several years will be more improved than when it lies but a single year; but the first year enriches it more than any succeeding year. The result to the land will be nearly the same, whether the grass be mown or eaten off by the stock. If farmers have not land necessarily appropriated to permanent pasturage, a year or two of temporary pasturage, on each of their meadows, might be advisable, prior to the regular course of rotation of crops.

Besides the benefit which the soil derives from the organic matters left in it during the pasturage, whether temporary or permanent, some of its mineral constituents are, by the action of the air, moisture, and the roots of the grass, brought into a soluble state to be of advantage in the succeeding year. Another advantage of pasturage, especially on stiff clay soil, is that it renders it more loose and friable. On dry, sandy soils, pasturage is beneficial, by causing the moisture to be retained longer, and also the dry organic matters and fine sand upon the surface, which would otherwise be blown away by the winds. Insects too have an agency in improving lands, by no means to be overlooked. They subsist upon the organic matters of the soil, which they bring into a minute state of division and deposit on the surface as they ascend by night through their holes. They furnish also, considerable organic matter, which is rich in nitrogen, by the death and decay of their own bodies. Thus these earth worms and insects, in the lapse of a few years, furnish a vast amount of the richest manure without the smallest expense, and as a compensation for the nuisance occasioned by their existence.

PEACOCK. If empire were obtained by beauty, and not by force, the crested peacock, without dispute, would be the king of birds. There is none of the feathered offspring, upon which nature has heaped her treasures with such boundless profusion. Of a tall stature, majestic step, and elegant proportions, every thing belonging to this bird seems to announce a creature of importance and distinction. It is crowned with a fine moveable crest, of the richest hue, which adorns and heightens, without burdening its head. The plumage and tail of this magnificent bird are adorned with colors so rich and various, that no human art can imitate, nor language describe them. When it struts in the sunshine, every moment produces a thousand shades of undulating and evanescent colors, that are continually replaced by other shades, always different and always admirably beautiful.

But this brilliant plumage, which exceeds the lustre of the finest flowers, fades, like them, every year, and drops in the moulting season; when the poor bird, as if afflicted on account of his loss, and afraid to be seen in so humiliating a condition, always seeks to conceal himself in some gloomy retreat, till the return of spring again restores him his splendid dress. At that season he resumes his station in the open field, to receive the homage due to his beauty; for it is alleged, that nothing so much gratifies his pride as the admiration of his gaudy apparel.



PEACOCK.

Peacocks, though spread over the greatest part of Europe, came originally from India; where they are found in vast flocks, in some parts of the hither peninsula and the Islands of the Indian ocean. So early as the days of Solomon, they were imported into Judea, by the fleets which that monarch equipped upon the Red Sea; and which, in all probability, traded to the coast of Malabar.

When the peacock was first brought into Greece, it was only to gratify the eye with the sight of his plumage. The Romans, however, who were richer, and carried by consequence every excess of luxury to a greater length, soon served them up as one of their most delicate dishes. Hortensius, the orator, is said to have first made the

peacock an article of food. His example was soon followed by the epicures in Rome, insomuch that the price paid for these birds soon became exorbitant. The luxurious and effeminate emperors that succeeded, refining upon the luxury of former times, took a pride in collecting immense dishes of the heads or brains of peacocks; dainties which had nothing to recommend them but the prodigious expense at which they were provided. The same thing may be said of their flesh, which is hard and dry. But probably the Roman cookery, which was carried to a very high degree of perfection, might compensate for these defects. Only the young at present are deemed good eating: the old are seldom dressed, except at some formal and splendid feast. In France, they were formerly served up with all their plumage, merely for show; a purpose for which they are perfectly suited, as their flesh is said to remain unaffected by corruption, for a longer period than that of most birds.

PEACH. The peach is a native of the warm climate of Persia. The tree is small and short-lived, but is rapid in its growth. It is sometimes known to bear fruit the third year; but usually not till the fourth or fifth. This, however, is but a short time to be in waiting for fruit of such delicious excellence; and then, although the tree does not long continue to bear, by setting out every year a few new trees, the family will annually have a supply of it. The fruit is too well known to need description. It flourishes finely in our Middle, Western, and Southwestern States; and occasionally it is found in tolerable perfection as far north as Vermont and New Hampshire. In climates and on soils most congenial to its health and productiveness, the culture of the peach is made a source of large remuneration. In New Jersey, Delaware, and Maryland are extensive peach orchards, in some cases, containing 20,000 trees, and yielding five, ten, or fifteen thousand dollars in a year from a single plantation. With such an inducement, it is a wonder that the number engaged in the business is not greater than it is. Occasionally the buds are destroyed by the frosts.

PEAR. The pear is a tall tree, of upright growth, generally smaller than the apple-tree, yet rarely it is found larger. It is a native of Europe and Asia, but not of Africa and America. In its original state, the fruit was austere and useless for dessert. Gradual improvements have been made, so that it is now rich, melting, and delicious, and in some of our finest kinds, it seems to be almost in a state of perfection. Under favorable circumstances, the pear forms a long-lived tree. Some are said to be several hundred years old. A Perry pear-tree in Herefordshire, England, produced fifteen hogsheads of perry in one year. The branches bent down and took root, covering half an acre of land. The Endicott pear-tree is still flourishing in Danvers, Massachusetts. It was imported by Governor Endicott in 1628. Near Vincennes, Illinois, is a pear-tree forty or fifty years

old, that is ten feet in circumference, and its branches extend sixty-nine feet. In 1834, it yielded 184 bushels of fruit. The original Harvard pear-tree is nine feet in circumference. And the late Mr. S. W. Cole, author of the *American Fruit Book*, a work of great merit, and of its size believed to be the best extant, had a wild pear-tree that was over seven feet in circumference, and he stated that the oldest inhabitants in its vicinity did not remember the time when it was much smaller than at present. Our best pears sell at from ten to fifteen dollars per barrel; and from one to two dollars per dozen.

PEA. The original locality of this hardy annual seems to be unknown. It has been cultivated in India, China, and Japan, for many centuries, and was introduced into this country at the time of its first settlement. It probably went to Great Britain from Italy. In the reign of Queen Elizabeth, the most delicate varieties were brought from Holland, and Fuller observes that they "were fit dainties for ladies, they came so far, and cost so dear." At the present day, the pea is very extensively diffused, and is well known as one of the most important culinary plants. The varieties are numerous, differing in stature, productiveness, the color of the flowers, and the time of ripening. They are adapted to almost any dry soil; yet they will give a much better yield on rich land. Fresh manure is not good for either peas or beans. They will bear a much heavier soil than the bean, good clays being highly favorable to their growth. For early table use in the family they are ordinarily raised in the garden; being sowed in drills and furnished with small poles or brush, so that they may occupy the least possible space, and be in a convenient position for being picked.

When wanted in larger quantities for families, to be used dry, or for stock, they receive a field culture. The land designed for them should be ploughed in the fall; and they may be sown in the spring immediately after the hard frosts, either in drills or broadcast. They should be covered in the soil to the depth of about two inches. If in drills, after they are up, a plough may be used to destroy the weeds. Where the soil is adapted to them, and the seed takes well, broadcast sowing is equally efficient in preventing weeds, as their vigorous growth effectually overshadows and keeps them under. The best kind for field sowing is the grass-pea, and the marrow-fat for garden culture. Earlier kinds should be selected in part for the garden. When broadcast, from two to four bushels of seed to the acre is the usual quantity used. In the garden, there should, in all parts of the season, be successive sowings about once in two weeks. By this means a family may be successively kept supplied for months; or till beans and other vegetables are grown. However, the hot weather of mid-summer is unfavorable to the growth of peas.

PEAT. This is a substance of vegetable origin, found wherever the soil has been soaked with water which has no outlet, and does

not completely evaporate by the heat of the sun. When dried peat is examined, it is found to consist of roots and fibres in every stage of decomposition, from the natural wood to the complete black vegetable mould. From the nature of its formation under the surface of water, it acquires a portion of tannin, which has the property of preserving animal and vegetable matter from decomposition. Hence large branches and trunks of trees are found embedded in peat, which have no mark of decomposition, except what have taken place before the wood was completely immersed in the peat. Peat contains all the elements of the richest manure, and may, by an easy process, be converted into humus. For this purpose, the agency of alkalies is the most effectual. If the tannin be decomposed, that of the vegetable fibre will go on, and soluble humus will be formed. When peat is newly dug up, if caustic lime be added to it, before it is dry, the moisture of the peat slakes the lime, which acts on the gallic acid in the peat, and neutralizes it. If this mixture be then excited to fermentation by the addition of animal matter, such as urine or dung, oxygen is absorbed, and carbonic acid evolved; and the residue is converted into an excellent manure, containing much soluble humus. The same may be effected more slowly by mixing peat with clay or marl, and allowing the mixture to remain exposed to the atmosphere for a considerable time, frequently turning it. But nothing accelerates this process like the addition of putrescent animal matter, which acts as a ferment, and greatly hastens the decomposition.

PELICAN. The pelican of Africa is much larger in the body than a swan, and somewhat of the same color and shape; its four toes are all webbed together, and the form of its neck bears some resemblance to the swan's. The singularity which peculiarly distinguishes this bird, chiefly consists in the form of its bill, and the great pouch which hangs underneath it, which has given rise to a variety of fabulous tales. This enormous bill is fifteen inches, from the point to the opening of the mouth, which is a good way back, behind the eyes; at the base it is rather greenish, but varies towards the end to reddish blue; in the beginning it is very thick, but tapers off towards the point in the form of a hook. To the under chap hangs this extraordinary bag, which extends along the whole bill, and reaches to the neck, and is said to be capable of containing no less than fifteen quarts; this bag the bird has the power of wrinkling up into the hollow of the under jaw; it is not covered with feathers, but with a soft, very smooth down, and, when empty, is scarcely perceptible; but when the pelican has been successful in fishing, it is astonishing to see to what a size it will extend; and it has been asserted, that it would contain as many fish as would satisfy the appetites of six hungry men.

PERENNIAL. In Botany, is applied to those plants whose roots will abide many years, whether they retain their leaves in win-

ter or not ; those which retain their leaves are called evergreens ; but such as cast their leaves, are called deciduous. Some of these have annual stalks, which die to the root every autumn, and shoot up again in the spring.

PERENNIAL PLANTS. In Gardening, are such as are of long duration. Such plants as are perpetuated by the roots, whether the leaves and stocks decay annually in winter, or always remain, provided the roots are of many years duration, are perennial. All plants, therefore, with abiding roots, both of the herbaceous, shrub, and tree kinds, are perennials ; though in the general acceptation of the word perennial, it is most commonly applied to herbaceous vegetables with durable roots, more especially those of the flowering kind, which, among gardeners, are commonly called simple perennials, particularly the fibrous-rooted tribe ; but it is equally applicable to fibrous, tuberous, and bulbous-rooted plants, whose roots are of several years duration ; likewise all shrubs and trees of every denomination, as having abiding roots, are perennial plants.

PERIOD OF LIFE. The natural limit of human life seems to be from 80 to 90 years. Few men survive that period—the greater majority die long before they even approach it. Of all new-born infants, one out of four dies the first year. Two fifths only attain their sixth year ; and, before the twenty-second year, one half of the generation is consigned to the grave. The order which death observes in cutting off his victims, is one of the most wonderful phenomena in nature—the causes by which it is effected are too numerous and too complicated to be here considered in detail. The unhealthy nature of certain occupations, the impetuosity of the passions, and the corruption of manners, prove no less fatal to life than the original weakness of the human frame. In general, the mean duration of human life is between 30 or 40 years ; that is, out of 30 or 40 individuals, one dies every year.

Rare examples, however, of extreme longevity, of a life of 150 years and upwards, seem to be common to all countries without distinction. If England, the salubrity of which is so highly extolled, has furnished three or four examples of men arriving at the age of from 150 to 169 years, Hungary, which, generally speaking, is not a very healthy country, has seen the celebrated Peter Czartan prolong his life to the 185th year, and John Rovin, at the age of 172, had a wife of 164, and a younger son of 117. It is in the Bannat of Temesuar, a very marshy district, and subject to the putrid fever, that these examples of longevity, and many others, have been observed. A mode of life, which is sober, and unruffled by tumultuous passions, singularly contributes to longevity. According to the author of a very curious little work, called the Apology for Fasting, 152 hermits, taken in all ages, and under every climate, produce a sum total of 11,589 years of life, and consequently an average of 76 years and a little

more than three months for each ; whereas the same number of Academicians, the one half belonging to the Academy of Sciences, and the other to that of Belles Lettres, give only 10,511 years of life, consequently 69 years and a little more than two months for the mortal career of each. It is therefore not improbable, that in the ages of patriarchal innocence, the period of 150 or even 200 years, was much more commonly attained than it is in our times.

PERSPIRATION OF PLANTS. In vegetable physiology, takes place chiefly from the surface of their leaves. In order to collect the liquor perspired, it is only necessary to introduce a branch of the plant into any sufficiently capacious glass vessel ; when the fluid which exudes will trickle down the sides of the glass, in great abundance, especially if the experiment be made in sunshine. The liquor thus obtained is of a clear watery nature, scarcely distinguishable to our senses, or to our chemical inquiries, from the sap of the same plant, whatever it may be, procured by wounding its branches before the foliage expands. This, which may be termed insensible perspiration of plants, becomes in some cases sensible ; as when it runs down, like a slight shower, from willow or poplar trees, in hot sunny weather ; or when it collects in drops on the leaves of plaintain trees in a stove. Hales and others have made experiments to ascertain the quantity of insensible perspiration in various plants. The great annual sunflower was found to perspire about seventeen times as much as the ordinary insensible perspiration of the human skin. The Cornelian cherry, *Cornus mascula*, is said to discharge, in twenty-four hours, as much fluid as is equal to twice the weight of the whole shrub. Succulent leaves perspire much slower than others, though they absorb in a far more rapid proportion.

This watery perspiration is the only excrementitious discharge of the vegetable body. The sap being carried up into the leaves, where it is acted upon by the air and light, for the most important purposes, yields those various and highly curious secretions, which, being carried down into the bark, afford matter for the increase of the tree, as well as for the manifestation of its various qualities. The great bulk of the sap which remains, as it does not return to the root, like the blood of animals to their heart, can be disposed of no otherwise than by a copious evaporation. Dr. Darwin was of opinion that this watery perspiration rendered a further service to the plant, by being acted upon by light, so as to give out oxygen, which was immediately absorbed by the air vessels.

PEWTER. A factitious metal used in domestic utensils. It is very uncertain in its composition. The common utensils of the lowest price, are made from an alloy composed of about twenty of tin, three of lead, and one of brass. The lead is of no use but to make it cheaper, and doubtless on this account is often used in larger proportion. The brass is intended to give stiffness and hardness, the tin

being of itself much too soft. Another alloy of this kind is made without lead, consisting of tin combined with antimony, and copper in small proportion, to give it hardness. This is manufactured into almost all the articles which are usually made of plated copper, and is known by the name of Britannia metal. The practice of putting lead into these alloys is extremely dangerous. Malt liquor, and particularly porter, always contain more or less ascetic acid, which cannot fail to dissolve some of that deleterious metal.

Lead may be mixed with tin in any proportion, without destroying the malleability of the compound metal, whereas the brittle metals, and copper, impart a brittleness to the alloy, when they exceed certain proportions. Hence lead and tin, with or without other smaller additions, form the pewter in ordinary use. Lead being the cheapest of the two metals, the manufacturer finds it his interest to employ it in as large a proportion as possible ; but danger having been apprehended from this noxious metal, the French government appointed a commission of some very able chemists to examine the subject ; and they found, that when wine or vinegar is allowed to stand in vessels composed of an alloy of tin and lead in different proportions, the tin is first dissolved ; whilst the lead is not sensibly oxydated by these liquors, except at the line of contact of the air and the liquor, and no sensible quantity of lead is dissolved even by vinegar, after standing for some days in vessels that contained no more than about eighteen per cent. of lead. Hence it was concluded, that as no noxious effect is produced by the very minute quantity of tin which is dissolved, a pewter may be considered as perfectly safe, which contains about eighty or eighty-two per cent. of tin ; and where the vessels are employed merely for measures, a much less proportion of tin may be allowed. But the common pewter of Paris was found to contain no more than about twenty-five or thirty per cent. of tin, and the remainder was lead.

PHOSPHATE OF LIME. The substance called phosphate of lime, is simply a compound of common lime and phosphoric acid. It is an important element in vegetable composition, and is the principal constituent of dry bones. Consequently, so far as the soil may be deficient in the phosphate of lime, the powder made from bones is a sure remedy. Eight pounds of bone dust in phosphates, are equal to one thousand pounds of hay or wheat straw. The value of bones is not dependent alone on the phosphates, but partly upon the gelatine and other organic matters which enter into their composition. These latter operate in the same way as the other organic tissues of animals. Bones are prepared for manure by boiling, by maceration in sulphuric acid and water, and by grinding ; the last of which methods is thought on all accounts to be preferable. The phosphate of lime is needful for the growth of about every description of the cereal family, in the seed, in the bran, and in the stem ; for in the ashes of each it is found more

or less abundant. However, in most varieties there is not a large quantity ; and it is calculated that two hundred and sixty pounds of bone dust—less than six bushels—are sufficient for all the phosphates contained in the crops which are procured from an acre, in a rotation of four years, in turneps, barley, clover, and wheat. Some lands will exhibit the benefit of such a dressing for twice or thrice that time.

PITCH LAKE OF TRINIDAD. Near point La Braye, Tar Point, the name assigned to it on account of its characteristic feature, in the island of Trinidad, is a lake which, at the first view, appears to be an expanse of still water, but which, on a nearer approach, is found to be an extensive plain of mineral pitch, with frequent crevices and chasms filled with water. On its being visited in the autumnal season, the singularity of the scene was so great, that it required some time for the spectators to recover themselves from their surprise, so as to examine it minutely. The surface of the lake was of an ash color, and not polished or smooth, so as to be slippery, but of such a consistence as to bear any weight. It was not adhesive, although it received in part the impression of the foot, and could be trodden without any tremulous motion, several head of cattle browsing on it in perfect security. In the summer season, however, the surface is much more yielding, and in a state approaching to fluidity, as is evidenced by pieces of wood and other substances, recently thrown in, having been found enveloped in it. Even large branches of trees, which were a foot above the level, had, in some way, become enveloped in the bituminous matter.

The interstices, or chasms, are very numerous, ramifying and joining in every direction ; and being filled with water in the wet season, present the only obstacle to walking over the surface. These cavities are in general deep in proportion to their width, and many of them unfathomable : the water they contain is uncontaminated by the pitch, and is the abode of a variety of fishes. The arrangement of the chasms is very singular, the sides invariably shelving from the surface, so as nearly to meet at the bottom, and then bulging out towards each other with a considerable degree of convexity. Several of them have been known to close up entirely, without leaving any mark or seam. The pitch lake of Trinidad contains many islets covered with grass and shrubs, which are the haunts of birds of the most exquisite plumage. Its precise extent cannot, any more than its depth, be readily ascertained, the line between it and the neighboring soil not being well defined ; but its main body may be estimated at three miles in circumference. It is bounded on the north and west by the sea, and on the south by a rocky eminence, and on the east by the usual argillaceous soil of the country.

PLAYFULNESS OF ANIMALS. Small birds chase each other about in play, but perhaps the conduct of the crane and the trumpeter is the most extraordinary. The latter stands on one leg, hops about

in the most eccentric manner, and throws somersets. This is sometimes called the mad bird, on account of these singularities. The crane expands its wings, runs round in circles, leaps, and, throwing little stones and pieces of wood in the air, endeavors to catch them again, or pretends to avoid them, as if afraid. Water birds, such as ducks and geese, dive after each other, and cleave the surface of the water with outstretched neck and flapping wings, throwing an abundant spray around. It is amusing to witness the sportive habits of turkies. Sometimes the whole flock, more particularly when the young brood is about half-grown, will start off like race horses, upon a run, as if a wager were to be awarded to the swiftest. Birds of the pie kind are the analogues of monkeys, full of mischief, play, and mimicry. There is a story told of a tame magpie, which was seen busily employed in a garden gathering pebbles, and with much solemnity and a studied air, dropping them in a hole about eighteen inches deep, made to receive a post. After dropping each stone, it cried currack ! triumphantly, and set off for another. On examining the spot, a poor toad was found in the hole, which the magpie was stoning for his amusement. Deer often engage in a sham battle on a trial of strength, by twisting their horns together and pushing for the mastery. All animals that pretend violence in their play, stop short of exercising it ; the dog takes the greatest precaution not to injure by his bite ; and the ourang outang, in wrestling with his keeper, attempts to throw him and makes feints of biting him. Some animals carry out in their play the semblance of catching their prey ! young cats, for instance, leap after every small and moving object, even to the leaves strewed by the autumn wind ; they crouch and steal forward ready for the spring ; the body quivering and the tail vibrating with emotion, they bound on the moving leaf, and again watch, and again spring forward at another. Rengger saw young jaguars and cuguars playing with round substances like kittens. Young lambs collect together on the little hillocks and eminences in their pastures, racing and sporting with each other in the most interesting manner. Horned cattle, particularly steers and young oxen, may be seen exercising together with their horns, as if they were taking lessons in means of self-defence. And calves will seemingly enjoy their frolics and gambols as much as boys in playing ball, or hide and seek.

PLANTAIN. This fruit is eaten to a remarkable extent by the inhabitants of the torrid zone. From its nutritious qualities and general use, it may, whether used in a raw or dressed form, be regarded rather as a necessary article of food than as an occasional luxury. In tropical countries, the plantain is one of the most interesting objects of cultivation for the subsistence of man. Three dozen fruits will maintain a person, instead of bread, for a week, and appears better suited to him in warm countries than that kind of food. Indeed, the plantain is often the whole support of an Indian family. The

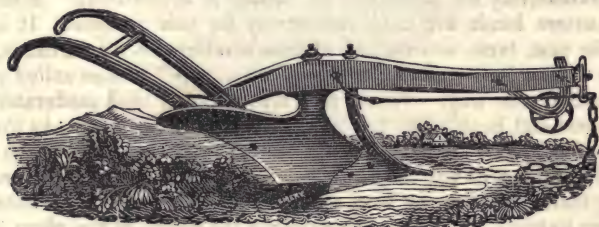
fruit is produced from among the immense leaves in bunches, weighing thirty, sixty, and eighty pounds, of various colors, and of great diversity of form. It is usually long and narrow, of a pale yellow or dark red color, with a yellow farinaceous flesh. But in form it varies to oblong and nearly spherical; and in color it offers all the shades and variations of tints that the combination of yellow and red, in different proportions, can produce. Some sorts are said always to be of bright green color. In general, in our climate, we place little value on it; to most of us the taste of it is insipid, unless it has had some preparation to make it palatable. It is more used in the West Indies than on the eastern continent in corresponding latitudes.

PLOUGHS AND PLOUGHING in rural economy denotes the stirring and turning over of land with the plough. This is one of the most essential operations in the culture of the earth, and requires to be performed with the greatest care. Whatever, therefore, may be the design of the farmer, or the destination of the ground thus moved, it ought never to be ploughed in a wet state; because the soil cannot be improved by such labor. Farther, the plough ought to be carried to a considerable depth into the soil; and, if one turning be not sufficient, it will be advisable to pass another plough over the same furrow, so that the land may be effectually stirred; when, being thus exposed to the air, its fertilizing properties will not only be considerably augmented, but all perennial weeds will be completely eradicated. Deep ploughing, however, is unnecessary for land that has been recently manured with lime or marl, but, on exhausted soils, it is uncommonly beneficial, and has, therefore, been generally recommended by the most skilful husbandmen.

Ploughing increases the food of plants; as it opens the soil for the reception of vegetable aliment from the air and light; and, the surface being consequently enlarged, a greater portion of land is thus exposed to its influence. Farther, by breaking up the ground, if it be too solid, and rendering it firm, in case it be too light, this operation greatly tends to improve the earth; and, as weeds and other vegetable substances are thus reduced to a state of putrefaction, it promotes the nourishment of the new roots. Lastly, ploughing removes too great humidity, by forming the land into small ridges, and contributes to the eradication of weeds, as it first causes their seeds to vegetate, and afterwards tearing up the young plants, exposes their roots to the drought, in consequence of which they are deprived of their vegetative power.

The oldest forms of the plough of which we have any description in ancient authors, or which are represented on monuments or coins, are very simple; a mere wedge with a crooked handle to guide it, and a short beam by which it was drawn, form the whole instrument. The Hindoo plough, now in use in many parts of India, seems to differ little from the old model. The greatest improvements in modern

ploughs are in the shape of a mould-board, and contrivances for regulating the line of draught so as to go at an equal depth, and cut off a regular slice of equal breadth, without any great force being applied by the ploughman. In addition to a regard to the form of the plough best accomplishing these objects, it is but little less important to combine lightness with strength, and with a reference to the least resistance in its progress by friction or otherwise, so as to diminish to the lowest possible degree the power to be applied in drawing it onward. If by improvements in these latter respects two oxen can accomplish what four oxen formerly did in the same time, and, if in the former respects, a boy is enabled, as ploughman, to perform with ease the labor formerly requiring the strongest man, the magnitude of saving to the whole agricultural community is immense. The substitution of iron for wood in the construction of the plough, and the present peculiar adaptation of form for an easy accomplishment of the objects to be attained, is a saving to that amount if no more.



PLOUGH.

Mechanical philosophy has rarely or never done a better service than in making improvements in an agricultural implement, of which from fifty to one hundred thousand are manufactured every year. We know single establishments that make each ten thousand in a year. Hitherto for some years past, so numerous have been the improvements in them, that it might seem that the article at present nearly approximates perfection. The kind of ploughs we used half a dozen years ago, then recommended as the best to be had, we have laid by to be preserved as memorials of a bygone period, and adopted others better adapted to our wants. It is scarcely to be presumed that one establishment can for any long period produce an implement materially of better form than all others; for any one neglecting to adopt improvements of general notoriety, would soon be left without patronage. When the particular form of ploughs in particular establishments is no longer susceptible of improvement, the reputation of them is to be kept up by superior artistic finish, in connection with an invariable use of the best wood and iron in their construction. The ploughs of Prouty and Mears have an enviable reputation, and

where they can most easily be procured, no one will be likely to seek for better articles ; but the Eagle or Worcester ploughs, manufactured by Ruggles, Nourse, and Mason, occupy the most prominent place in public opinion, it appears to us. The oak used at Worcester is proverbially as tough as leather. In addition to the mechanical skill belonging to the establishment, it is believed, that the views of the Hon. F. Holbrook, perhaps the most critically scientific ruralist on this subject in the country, have been adopted by the proprietors ; and to complete their claims to this high excellence, they have received over four hundred premiums for their ploughs from different agricultural societies in the United States.

PLUM. The plum is a native of Asia, the south of Europe, and America ; but most of our cultivated kinds are foreign, or descendants from them. It is a small tree, of a rather low spreading form, generally of rapid growth, and moderate duration. The plum is a fine dessert fruit, some varieties being remarkably rich and luscious. It is used extensively for preserves, for which it is excellent. Some acid and austere kinds are used exclusively for this purpose. It is also used for pies, tarts, sauces, and various condiments. In France, dried plums are an important article in commerce. Varieties called prunes are used in this way. Plums well ripened, and used moderately, are nutritious and healthful ; but in excess they are injurious, as they are rich and cloying. The great obstacle to the raising of plums is the curculio, an insect which, soon after the blossom falls, punctures the young fruit, and then lays an egg in the wood. The gum oozes out, the egg hatches, the worm eats towards the centre of the plum, which falls, often before half grown, and the worm enters the earth, where it remains in a pupa state, some say a few weeks, others say till the next spring, when it emerges to commit a similar ravage on the fruit of the plum tree. As yet no antidotes effectually protect the plum against the depredations of this mischievous insect.

POLAND HENS. Poland fowls, as they are generally called, were according to English authors, said to be imported from Holland. Their color is a shining black, with a white top-knot of feathers on the heads of both cock and hen. They are not so thickly covered with feathers as some other breeds, and still less so with down. They are quiet and domestic, neither quarrelsome or mischievous, and their eggs of a good size, fine flavored, and thin shells. The true breed is rather above the middling size ; their form is plump and deep, and the legs of the best sort are not too long, and most have five claws. The top-knot of upright, white feathers, covers so much of the head as almost to blind the eyes. The contrast of this perfectly white crest with the black plumage, is exceedingly beautiful ; but the top-knot of the cock differs from that of the hen—hers being broad and erect feathers, while his are narrow and hanging down in every direction ; but they must be perfectly white and the rest of the plumage black ;

broken colors, it is said by some, show a cross breed. The Poland hens, by many, are esteemed the best layers, seldom wanting to set. There is a white variety of top-knots, without a feather of any other color. These are very beautiful, but not quite so hardy as the black. And there is also a gold and black, or pheasant colored variety. But these are scarce in the United States.



POLAND FOWLS.

POMEGRANATE. The pomegranate is a fruit in the form of an apple or quince, full of seeds or kernels, inclosed within a reddish pulp, sometimes sweet, sometimes acid. It is so called either from the abundance of its grain or kernels, *pomum granatum*, a kernelled apple, or from the country where it was anciently produced, viz. Granada. The pomegranate is, however, a native of the south of Europe, and grows to the general height of an apple tree; the branches are a little prickly; the leaves resemble those of the great myrtle; and the fruit, which is composed of red angular grains, is inclosed in little distinct cells, the whole of which are enveloped by a thick and highly astringent outer rind. Pomegranates are by some esteemed. Of the kernels are made syrups and preserves; the peel contains a considerable quantity of astringent matter.

POND MUD. Small ponds, into which is conveyed the wash from the circumjacent hills, often contain, at their bottom, a thick stratum of very rich, unctuous sediment, which if removed at times when the water is dried up by the powerful heat and continual evaporation which occur during the sultry months of summer and early autumn, makes a most valuable ingredient in compost, and is even a

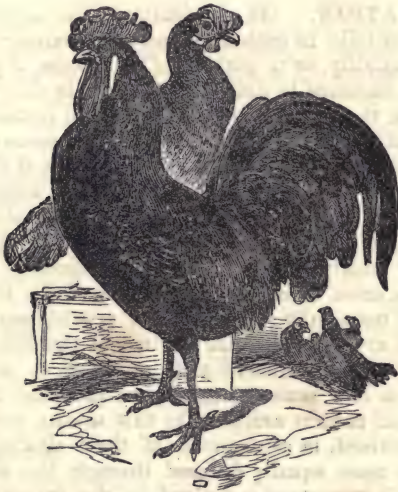
strong and efficient fertilizer when applied to the soil in its crude state, especially if the texture of the land on which it is spread, is light and dry. All the animal excrement, and decayed vegetable matter produced on the surrounding hills, naturally finds its way into these pools or ponds, and is there retained till removed, often forming rich muck and presenting an almost inexhaustible source of fertility to the farmer who is possessed of sufficient enterprise to avail himself of its latent wealth. By hauling this rich deposit into his yards—exposing it to the free action of the frost and air, in open situations, or by spreading it upon the surface of light lands, he will find it productive of highly beneficial effects. As a top dressing for grass lands, it possesses great efficiency, and retains its energies unimpaired for a longer time than stable manure, or perhaps any other decomposable manure that can be applied.

POPPY. The species of poppy are herbaceous plants, all bearing large, brilliant, but fugacious flowers. One of them yields the opium of commerce, and the juice of all is lactescent. Most of the species are natives of Europe, often occurring as weeds in fields and waste places; but, in this country, we only see them in gardens, cultivated for ornament. One, indeed, the *papaver nudicaule*, is found in all the extreme northern regions of the globe. Their roots are annual or perennial; the leaves alternate, and the flowers terminal and drooping until they are expanded; the calyx is composed of two leaves, and the corolla of four petals; the stamens are very numerous, and the capsule is one-celled, but is divided internally by several longitudinal partitions, and contains a multitude of seeds.

PORK. The hog is the only domestic animal that we know of no use to man when alive, and therefore seems properly designed for food. The Jews, however, the Egyptians, and other inhabitants of warm countries, and all the Mahometans at present, reject the use of pork. The Greeks gave great commendation to this food, and their *Athletæ* were fed with it. The Romans considered it as one of their delicacies. With regard to its alkalescency, no proper experiments have yet been made; but, as it is of a gelatinous and succulent nature, it is probably less so than many others. Upon the whole it appears to be a very valuable nutriment. The reason is obvious why it was forbidden to the Jews; their whole ceremonial dispensation was typical. Filth was held as an emblem or type of sin. Hence the many laws respecting frequent washings; and no animal feeds so filthily as swine. Mahomet borrowed this prohibition, as well as circumcision and many other parts of his system, from the law of Moses. But it is absurd to suppose, as some do, that Moses borrowed any thing of this kind from the Egyptians.

POROSITY. Porosity is a property common to all the bodies of nature, at least we know of none in which the particles are contiguous to one another. In some, as sponge and cork, the pores are visible to

the eye, and in others they may be rendered so by the aid of a microscope. In bodies, whose pores are not thus manifest, the existence of the intervals between the molecules is proved by various circumstances. Thus water or mercury being contained in an open vessel of wood over the exhausted receiver of an air-pump will, by the pressure of the atmosphere, be forced through the wood, and fall thence in a shower; liquids also are frequently filtered by being made to pass through the pores of paper; and in the Florentine experiment for determining whether or not water is compressible, the fluid was by pressure forced through the pores of the vessel of gold in which it was contained. Again, the porosity of bodies is inferred from their elasticity, and the sounds which are heard when the molecules are in a state of vibration; also, in transparent bodies—and the most dense metals are, when rendered sufficiently thin, found to be transparent—it is inferred from the fact that the particles of light pass through them, or that the vibrations of an æthereal fluid takes place among the molecules. Finally, the porosity of bodies is proved from the fact that they suffer contraction of volume by being exposed to cold, and by mechanical compression, since such contractions can only take place in consequence of the particles being forced closer together than they were in the usual states of the bodies.



POULTRY.

POULTRY. This term includes all the domesticated birds reared for the table, fowls, turkeys, geese, ducks, and Guinea hens. It might seem a waste of words to attempt proving that poultry should be kept

by every family in the country. Most persons may not think it expedient to keep enough to render any pecuniary profit to be received in this way an object worthy of consideration. That there is a profit from the eggs of hens, when properly managed, beyond what can be derived from most branches of rural gain, according to the amount invested, has been sufficiently proved. The profit of one hundred hens in the year, properly managed, cannot be less than one hundred dollars, after paying every expense attending them. But if there were no pecuniary profit from them, the part they contribute in supplying our tables with their most valuable stores, renders them indispensable. True, it costs something to feed and shelter them; and occasionally they may interfere with some of our other interests, as well as occasion us some vexations. Yet, how amply do they compensate us for all this! How much do they add to the cheerfulness and gaiety of the farm! Who can fail to be interested, and oftentimes delighted with the ceaseless clatter of their commingled tones of joy for sunshine and food! Were it not for the pompous shouts of the gobbler, and the lordly crowing of Chanticleer, what an unchanged silence would now and then reign about the farmer's door-yard! But with that and the perpetual cackling of an hundred hens, each daily leaving their nests after laying, is a specimen of animated nature scarcely elsewhere to be witnessed.

PULVERIZATION. In Agriculture, the separation of the earthy particles of soils, in such a manner as to render them of a fine mellow mouldy quality, or to partake of the nature of powder. This state of mould is obtained in different ways, as by frequent ploughing and harrowing in the less stiff sorts of land; and in those of the more heavy and retentive descriptions, by the same means, and the frequent exposure of them to the influence and effects of the atmosphere, with the growth of such sorts of crops as produce a close thick shade upon them. This state of the soil, when produced in lands, has various advantages, the roots of plants penetrate it with more readiness and greater facility. It admits of the particles of moisture more equally, and in a more extensive manner, by which the fibrous roots of the crops are more fully supplied with nourishment. It likewise produces a more equal and regular mixture of the different materials of which the soils are constituted and composed, so as to yield the nutrition of plants in a more extensive and abundant manner. The rains in the vernal months are also, by this means, more abundantly drank up and retained, in consequence of their sinking to a greater depth, as well as more equally diffused through the different parts, from which much advantage is derived in the support of the crops. By this fineness in the particles of the soils, the manures, or other ameliorating substances, are also more extensively and more perfectly blended and incorporated with them, and of course a more equal and abundant supply of nutritious materials provided for the growth and

increase of the crops, of whatever kind they may be. And the air of the atmosphere is more intimately and abundantly received and blended with them. These are a few of the various advantages that may be derived from the pulverization of land ; but there are many others noticed by writers on agriculture and rural economy.

PUTREFACTION. This is the spontaneous decomposition of animal and vegetable substances, attended by the evolution of fetid gases. The putrefactive fermentation of animal substances is usually attended by more fetid and noxious exhalations than those arising from vegetable products. This appears principally referable to the more abundant presence of nitrogen in the former ; and hence those vegetables which abound in nitrogeniferous principles, such as most of the cruciform plants, exhale peculiarly nauseous effluvia ; hence, also, such animal products as are destitute of nitrogen are either unsusceptible of what is usually called putrefaction, or suffer it slowly and imperceptibly. The putrefactive effluvias are, for the most part, easily decomposed, and resolved into new and comparatively innocuous compounds by the agency of chlorine ; hence the importance of that body as a powerful and rapidly acting disinfectant. The rapidity of putrefaction, and the nature of its products are, to a great extent, influenced by temperature, moisture, and access of air ; they do not ensue below the freezing point, nor in dry substances, nor under the entire exclusion of oxygen. The astringent principle of vegetables, as seen in the tanning of leather, is a powerful preserver of most organic tissues. The anti-putrefactive powers of salt are well known. When a piece of meat is salted, brine runs from it, in consequence of the energy with which the salt abstracts the component water of the muscular fibre ; the flesh becomes indurated, and its susceptibility to putrefactive changes is greatly diminished ; but it becomes at the same time less easy of digestion as an article of food.

QUADRUPED. In its simplest and most general meaning, a four footed animal. But as such an interpretation must include a prodigious multiplicity of animals of very different habits and structures ; as, for example, not only hooved and clawed land animals, but lizards, tortoises, frogs, and other amphibious reptiles, and perhaps various kinds of insects, it has been necessary, in the study of natural history, to limit its meaning, in order to be able to apply it to any definite purpose, and hence it has generally been restrained to such animals as have not only four feet, but a hairy body, produce viviparously, and suckle their young.

QUASS. This is the name of a liquor in Russia, which serves the natives not only for drink, but also for sauce to a number of dishes ; and it is the basis of the favorite cold soup of the North, which is made by adding cold meat, cut in pieces, with cucumbers, salted after a peculiar manner, or with onions, or garlic, to a bowl of this sub-acid liquor. The common Russian quass is prepared by putting into a

large pot of cold water, as much rye flour as will make thin dough ; this is then placed in an oven moderately heated, for three hours, and afterwards taken out and thrown into a tub of cold water ; the mixture is worked with a machine like a chocolate mill, till it froths. To this liquor is added two basins of the grounds of old quass, leaven or a piece of their sour bread ; and the tub is covered with cloth, and laid by till the liquor has acquired a sourish taste, which marks its being ready for use.

QUINCE. A low, tortuous tree, named after the ancient town of Cydon, in Crete, from which place it was said to have been introduced into the other parts of Europe ; but it appears to grow wild in Western Asia, and some of the neighboring parts of Europe. It is now cultivated throughout Europe, and in many parts of the United States, for the sake of its fruit, which, though hard and austere when plucked from the tree, becomes excellent when boiled and eaten with sugar, or preserved in syrup, or made into marmalade. Quinces, when mixed with other fruit, in cookery, communicate a very pleasant flavor ; and a delicious wine may be made from their juice, mixed with sugar in the proportion of one quart to the pound, and fermented. The leaves of the quince tree are simple, alternate, and entire ; the flowers are large, white, sometimes with a blush of rose, and are solitary at the extremity of the young branches, and the fruit is somewhat pear-shaped, yellowish, and cottony, internally containing five cartilaginous cells, in each of which the seeds are arranged in two series, to the number of eight and upwards, and covered with a mucilaginous substance. The character of the numerous seeds is the principal circumstance in its structure, which distinguishes the quince from the apple and pear. The quince succeeds best in a light soil ; if it be too rich, the fruit becomes insipid, and if too dry, it remains small and coriaceous.

RADISH. A well known esculent root, universally cultivated in temperate climates, and in daily use. Several varieties have been produced by long cultivation, differing in the form, size, and color of the roots ; either turbinate or round, spindle-shaped ; annual or biennial ; white, red, violet, or blackish, externally, but always white within. The taste is more or less pungent in these different varieties ; but they are good only when young, becoming hard, woody, and hollow, with age. The radish requires a deep, loose soil to attain perfection, and it may be produced successively throughout the year, by sowing monthly. It is of easy culture, but, during extreme heats, frequent irrigation is necessary, which renders the roots more mild and tender. The seed will keep five or six years. The stem of the radish is herbaceous, upright, two or three feet high, and rough, with short hairs. The leaves are alternate, the superior ones simple and sessile, the inferior lyrate, divided into oval or rounded lobes, toothed on the margin, with the terminal lobe much the largest. The flowers are white or

purplish, disposed in terminal racemes. The pods are cylindrical, acuminate with the style, indehiscent, and swelling into knots, and contain rounded seeds. These seeds are oleaginous, and in one variety, lately introduced from China, the oil is extracted and used for culinary purposes. Radishes are antiscorbutic and stimulant, but are little employed in medicine. The plant was originally brought from China and Persia, but has been cultivated in Europe from time immemorial.

RATAN. A genus of palms, but widely differing in habit from the rest of that family, and, in this respect, somewhat resembling the grasses. The species have all perennial, long, round, solid, jointed, unbranching stems, extremely tough and pliable, often ascending among the branches of trees, but without prickles or tendrils. They grow in profusion along the banks of rivers in tropical Asia and the neighboring islands. All the species are very useful, and are applied to various purposes; the fruit and young stems of all furnish nutriment, and a drink is obtained from the liquid which flows from wounds made in the spadix.

One species is even cultivated for its fruit, which is about the size of a walnut, and covered with scales. Certain species furnish cables, cords, and withes of exceeding strength; others are split into strips for making the seats and backs of chairs, baskets, and other light and elegant articles of furniture; those which are larger and firmer, and whose joints are more distant, afford elegant walking sticks; in short, the economical purposes to which the various species of ratans are applied, are very numerous, even in northern climates. A trade in ratans, to a considerable extent, is carried on from several of the East India islands to China, which is the principal market for them.

RASPBERRY. In its wild, unimproved state, the raspberry is a native of various temperate climates, to be found growing in thickets, woodland, and rough mountain districts. Several varieties are known, which differ from each in their habits of growth and hardiness, as well as in the quality of their fruit. The cultivation of the raspberry on an extensive scale for market, is found to be very profitable, for the crop is generally large, and always commands a good price. A Mr. Hallock, of Ulster county, in the State of New York, has a plantation covering three-fourths of an acre of land, which, in the season of 1848, yielded thirty-three hundred baskets of fruit. He sold them in the city of New York, at an average price of ten cents per basket, being at the rate of four hundred and fifty dollars per acre. Such a return cannot be expected from anything besides the very best management. An idea that the raspberry will flourish without cultivation, is very prevalent among those who consider themselves gardeners. On the contrary, it requires a good soil, the occasional application of manure, and regular pruning, quite as much as the cherry tree or the grape vine. We frequently hear people complaining that the improved

varieties, which they have procured at considerable expense, are but little better than the old-fashioned kinds to be found on the roadside. The reason is obvious; the bushes are set perhaps in the most unfavorable part of the premises, and then allowed to take care of themselves. To expect that they will yield fruit in abundance, and of the best quality, is about as reasonable as it would be to suppose that a boy, left to follow his own headstrong will, and allowed to run wild with all kinds of associates, can become a respected member of society.

The ease with which raspberries are produced in the garden, is a sufficient inducement for every family to pay so much attention to the culture as to be furnished with an ample supply for its own use, if nothing more. The use of this fruit is not only harmless, but is favorable to health. It ripens at a season of the year when something of the kind is peculiarly needful to assist in creating an appetite without impairing the digestive powers, or deranging the other organs of the animal system. Succeeding the strawberry in quick succession, the raspberry seems designed by Providence to answer a valuable purpose in supplying us with such a delicious fruit.

RAY. Rays are defined, by Sir Isaac Newton, to be the least parts of light, whether successive in the same line, or contemporary in several lines. For that light consists of parts of both kinds is evident, since one may stop what comes this moment in any point, and let pass that which comes presently after; now the least light, or part of light, which may be thus stopped, he calls a ray of light. It has been found by experiment, that there is a very great difference in the heating power of the different rays of light.

It appears, from the experiments of Dr. Herschel, that this heating power increases from the middle of the spectrum to the red ray, and is greatest beyond it, where the rays are invisible. Hence it is inferred that the rays of light and caloric nearly accompany each other, and that the latter are in different proportions in the different colored rays. They are easily separated from each other, as when the sun's rays are transmitted through a transparent body, the rays of light pass on seemingly undiminished, but the rays of caloric are intercepted. When the sun's rays are directed to an opaque body, the rays of light are reflected, and the rays of caloric are absorbed and retained. This is the case with the light of the moon, which, however much it be concentrated, gives no indication of being accompanied with heat. The solar rays pass through transparent bodies without increasing their temperature. The atmosphere, for instance, receives no increase of temperature by transmitting the sun's rays, till these rays are reflected from other bodies, or are communicated to it by bodies which have absorbed them. This is also proved by the sun's rays being transmitted through convex lenses, producing a high degree of temperature when they are concentrated, but giving no increase of temperature to the glass itself. By this method the heat

which proceeds from the sun can be greatly increased. Indeed, the intensity of temperature produced in this way is equal to that of the hottest furnace. This is done, either by reflecting the sun's rays from a concave polished mirror, or by concentrating or collecting them by the refractive power of convex lenses, and directing the rays thus concentrated on the combustible body.

If the rays of light, after passing through a medium, enter another of a different density, perpendicular to its surface, they proceed through this medium in their original direction. But if they enter obliquely to the surface of a medium, either denser or rarer than what they moved in before, they are made to change their direction in passing through that medium. If the medium they enter be denser, they move through it in a direction nearer to the perpendicular drawn to its surface. On the contrary, when light passes out of a denser into a rarer medium, it moves in a direction farther from the perpendicular. To prove this, take an upright empty vessel into a darkened room, which admits but a single beam of light obliquely through a hole in a window shutter. Let the empty vessel stand on the floor, a few feet in advance of the window which admits the light, and let it be so arranged, that as the beam of light descends towards the floor, it first passes over the top of the side of the vessel next the window, and strikes the bottom on the side farthest from the window. Let the spot where it falls be marked. Now, on filling the vessel with water, the ray, instead of striking the original spot, will fall considerably nearer the side towards the window.

REAPING MACHINE. The tedious process of reaping or cutting the different kinds of grain by a sickle is well remembered. The labor required being generally at a season of the year when the heat of the sun is the most oppressive, the toil is proportionally more severe. The introduction of the cradle as a substitute of the sickle was indeed a great attainment to the extensive grain culturer; but to such as have from twenty to two or three hundred acres to be cradled, the toil was enormous. Nor was this the only evil to be alleviated. As soon as grain becomes ripe it should all be cut and harvested without delay. If it becomes overripe, or if wet by showers after being cut, the damage may become great to the crop. To cut these large fields by hand, and to harvest them without being damaged from wet or over-ripeness, is not ordinarily to be accomplished. Laborers enough to do it is among the impossibilities of the case. The invention, therefore, of reaping machines, to relieve laborers from such severity of toil, and to save grain from loss and damage, is one of the most important acquisitions to agriculture that has been made.

Several reaping machines have been presented to the public, of varying shades of merit; but, as good as they all may be, it seems now to be an admitted fact, the machine of McCormick takes precedence. So it may be inferred from the success attending its mission

to the World's Fair. It would not be feasible, in a short article like the present, to exhibit a description of its several parts, enabling the reader to understand the perfection of its movement and the rapidity of its execution. To realize this, it must be seen when at work; and so wonderful is the result, one would then find a difficulty in believing the evidence of his own senses. When first offered on sale, the proprietor guaranteed that it should, on an average, when at work, cut the grain of an acre in forty minutes, or about twenty acres per day; and in case of failure the machine might be returned. Yet, although several thousands had been sold during the first three years, it was stated at the end of that time, that no one had been returned. No better evidence can be given that it is satisfactory to the purchasers.

It is drawn by two horses, to be relieved in due time by two others; and the four are thus to work alternately through the day. A boy of sixteen can drive them, and a man is required to rake the grain from the machine into parcels on the ground, as it passes on, of a size suitable for sheaves. It will take six or seven hands to bind the sheaves and put them into shocks, as fast as they are made ready. It is also affirmed, that in every acre of land, a bushel of wheat that would be lost from being trodden down or shell out with the use of the cradle, is saved by the machine, which is equal to about three quarters of the cost of operating it. The cost of it is one hundred and twenty dollars. This and the other reaping machines have undergone, it is believed, since first in use, sundry improvements. When any defect was discovered, a remedy was devised as in machinery generally.

REINDEER. Amidst the many striking marks which are every where exhibited of the supremacy of that Power that called us into life, in no instance do we trace stronger proofs of his beneficence than in the formation of that animal called the reindeer. In a country where the beauties of nature are unknown, and sterility and barrenness have established their seat, how dreadful would be the situation of its wretched inhabitants but for the advantages they enjoy from this domesticated friend! The severity of the climate, which is fatal to many quadrupeds, is the means of increasing this animal's strength; for whenever it has been transported into a more genial country, the change shortly proves destructive to its life. The comforts of the Laplander absolutely depend upon the services he derives from this useful race of animals: they conduct him over tracts that would otherwise be impassable, supply him with an abundance of wholesome food, and afford his body a covering from the severities of the cold.

The horns of the reindeer resemble the American elk; and they likewise have antlers springing from the brow; it is not so tall an animal as the stag, though it is much stronger, and more calculated to endure fatigue. When they first shed their coat, their color is

brown ; but as the summer approaches, it begins to grow light, and varies until it becomes nearly gray ; the hair upon its body is thick and long, calculated to defend it from the severity of the clime ; and contrary to the rest of the deer species, the female is adorned both with antlers and horns.

There are two kinds of reindeer in Lapland ; the one wild, and the other tame ; the latter are chiefly used for drawing the sledges, as the former will seldom submit to their guide. The sledges are built remarkably light, and their bottoms covered with a young deer's skin, with the hair placed in a proper direction to glide over the congealed snow. The person who sits on this vehicle guides the animal with a string fastened round the horns, and encourages him to proceed by the sound of his voice, or compels him forward by the assistance of a goad. The wild breed, when harnessed, are sometimes so refractory, that their drivers find it impossible to make them proceed, and are obliged to hide themselves under their conveyance to avoid the attack it would make upon their lives. There is scarcely a part of this animal but what is serviceable to the inhabitants, and proves the benevolence of that Power by whom it was made ; its flesh, as I have observed, supplies them with food ; and though it does not give milk in large quantities, yet it is both nourishing and sweet. As to butter, they seldom make any ; but they boil the milk with sorrel, which makes it coagulate and grow thick ; they then put into casks, or skins, and bury it in the earth as a winter's regale ; but the skin is the most valuable part of this animal ; it supplies the inhabitants with bedding, clothing, and shoes ; nay, even the blood is preserved in small casks, to make sauce with the marrow of those which are killed in the spring.

RENNET. The preserved membrane of the calf's stomach is called rennet, and it has the property of coagulating the albumen of milk, and converting it into curd and whey. The maw is cleaned, salted, and stretched upon a small hoop or frame, like parchment. Previous to its use, the salt is extracted by washing the rennet ; which is then soaked in hot water during the night ; and in the morning the infusion is poured into the milk to coagulate it. Coagulation is the result of the gastric juice, which is acid ; and acts upon the caseous part of the milk, in the same manner as other acids. It has sometimes happened that no rennet sufficiently good can be had for curdling milk. In that case, vegetable acids are used for the purpose.

REPRODUCTION. This is one of the most important provisions of nature, inasmuch as it guards animals and plants against the multiplied dangers to which their bodies are exposed. Hence, when viewed in the connection with the system of nutrition, altogether, it forms one of those decisive and grand characters which distinguish at once the machines that proceed from the hand of the Creator, from

all, even the most ingenious and boasted productions of human skill. The difference is recognized at the first glance; the distance is immeasurable. The springs and wheels of mechanical instruments have no power of repairing themselves, when they are bent, broken, worn, or spoiled; but such a faculty is enjoyed in various degrees by every animal and by every plant.

At different periods of the year, several organized beings lose, by a spontaneous and natural process, certain parts of their bodies, which are subsequently renewed. Examples of this occur in the fall of the stag's horns; in the moulting of birds; in the renewal of the cuticle of serpents and other amphibia, of the larvæ of insects, and of the shell of the crustacea, and the fall of the leaves of the trees. This may be called ordinary or natural reproduction. The stag's horn, or antler, as it should be more properly called, is a mass of true bone, possessing the structure and characters of osseous substances. In its early state it is soft, and traversed by large vessels, which must be reproduced every time the new horn is formed. This annual reproduction constitutes, in many points of view, one of the most remarkable phenomena of animal physiology.

The cuticle of the snake is separated every year, and comes off as a complete sheath, excepting the aperture, through which the animal escapes; the covering of the cornea is shed with the rest of the external integument. Crustaceous animals, for instance, the crab and lobster, have a skeleton, which surrounds and contains their soft parts, and which serves, at the same time, the purposes of a skin. When it has attained its perfect consistence, it grows no more; but, as the soft parts still increase, the shell separates, and is detached, being succeeded by a larger one. The calcareous bodies in the stomachs of these animals performing the office of teeth, are shed with the shell.

The second, or extraordinary kind of reproductive power, is that by which wounds, fractures, or any accidental mutilation or loss of parts of an organized body are remedied or restored. This exists in very different degrees in different departments of the animal kingdom. In man, and such animals as are nearly allied to him, the property is very limited, although sufficiently active to be capable of remedying the effects of great injuries. If a bone be broken, a muscle or tendon divided, or a piece of skin destroyed, processes are set up in the parts by which restoration is accomplished. The ends of the bones are joined by an osseous substance, which gives to the part its original solidity; the tendon regains its firmness and power of resistance; the muscle can contract again and move the points of its attachment; and the surface of the body is covered by a new piece of integument. The functions of the parts are restored; but the newly formed matter can be always distinguished from the original composition of the body, and possesses a weaker vitality. For, in some cases, old ulcers have

broken out afresh, and even fractures have been disunited in states of great general debility.

REPTILES. Reptiles are distinguished from birds and quadrupeds by their cold blood and single heart, that is, with only one ventricle, and from fish by their respiring through lungs. Their blood is never at a much higher temperature than that of the medium in which they live. No other animals are capable of enduring so great extremes of heat and cold as the reptiles, especially some particular species. Frogs, for instance, have continued to live in the human stomach, and in lumps of ice. From the peculiar structure of their bodies, they are able to suspend their respiration for a considerable time, and are also endowed with the faculty of enduring an abstinence that would prove fatal to warm-blooded animals. Most of them can live in the air as well as in water. Many live indifferently in either element. Some pass a certain period of life, or certain seasons of the year, in one, and the rest in the other; and some, finally, are confined to the water, or to the land. They live chiefly in morasses, swamps, and stagnant waters, damp, dark places, caves, and holes in the earth.

As means of defence, nature has given to some of them great bodily strength, or sharp teeth, as to the crocodile; to others a deadly poison, as to certain kinds of serpents; to others, a hard covering, as to the tortoise; to many, a disgusting smell, or an acrid humor, which they eject. Some of them have a remarkable power of reproduction, by which they renew parts of the body of which they have been deprived. Some can live for an incredibly long time without air, and even without food, and some undergo transformations like insects. None of them chew their food, but they swallow it whole, and digest it at leisure. They are in general extremely tenacious of life, and will continue to move, and perform their animal functions, even after the severest injuries. Their colors and general appearance are, in most instances, disagreeable; some, however, are decorated with the most vivid coloring. Their voices are either harsh and grating, or they are entirely dumb. Most reptiles are oviparous. In some, particularly in the frosts, the eggs are not fecundated until after their expulsion from the female; hence they are merely provided with a thin membranous covering. The eggs of others, as the tortoise's, have a soft, tough skin, resembling parchment, while, in other genera, the eggs are furnished with a hard, calcareous shell. In those species which are viviparous, the eggs are regularly formed, but are hatched internally, as in vipers.

RESIN. From the various species of pine, there exudes a balsam which concretes in the form of tears. It differs somewhat according to the peculiar tree from which it is obtained, and by distillation it is separated into two distinct ingredients; oil of turpentine, which is volatile, and resin, which is not. If a quantity of pine wood is col-

lected, covered with turf, and then set on fire, the resinous juice which would have been dissipated in the open air, may be collected in a suitable receptacle beneath. In this way, tar and pitch, two well known articles of commerce, and both of a resinous nature, are usually procured. From a shrub that grows in Palestine and Arabia, is obtained a resin long celebrated for its medical virtues. It is the Balm of Gilead, so frequently alluded to in sacred history, and it is highly prized by the Turks, who prohibit its exportation.

No kind of wood is so durable as that in which the resinous secretion abounds. It is rarely injured by those insects which devour the hardest timber, and the insolubility of resin most effectually secures it from the destroying agency of water. As a proof of this fact, it has been observed that the cypress gates of Constantinople, erected by the Emperor Constantine, were found undecayed a thousand years after they were built. It is owing to this secretion that pine is more durable than the hardest oak, though at the same time it contains much less of the woody fibre, on which the value of timber usually depends.

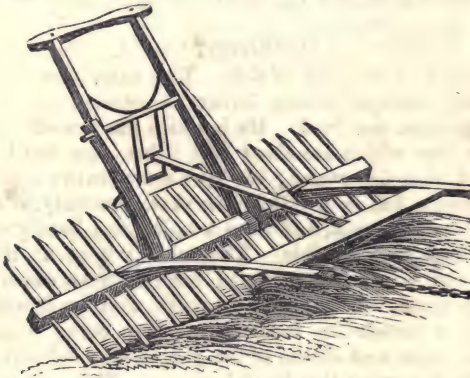
RESPIRATION. In Physiology, that function of animal bodies, in which the air, either in its elastic state, as it constitutes the atmosphere, or held in solution in water, is brought into contact with some organ or organs, undergoing alterations in its own constitution, and producing changes in the nature of the animal fluids, which are essential to the continuance of life. In the mammalia, birds, and reptiles, the respiratory organs consist of lungs, that is, of membranous cavities, differently constructed in the three classes, but agreeing in the circumstances of alternately receiving and emitting a portion of atmospheric air. This alternate ingress and egress of air constitutes properly what is called in common language breathing, to which the philosophical term respiration is synonymous.

Although the structure of organs in fishes and insects is so different from that which we find in mammalia, birds, and reptiles, they perform an analogous office, answer the same general purposes in the animal economy, and are considered equally in the light of organs of respiration; this term being employed now to denote the general effect produced by these various organizations, without any reference to the means through which it is produced; although it was originally applied to the passage of the air to and from the lungs, when the results of that process were unknown.

The functions of the respiratory organs are closely connected with the other great processes of the animal economy. The heart, brain, and lungs, more particularly influence each other, and present, in their mutual relations, numerous and highly interesting considerations for the physiologist.

REVOLVING HAY RAKE. Every person familiar with the routine of labor on the farm, must be aware of the excessive toil and the frequent pressing urgency for despatch in the season of hay making.

On large farms, where sometimes whole meadows of grass are in swath, or in a condition to be raked up, and clouds suddenly arise, denoting showers or a storm, it is well known what alarm is created, especially when the whole reliance for guarding against damage is on the hand use of the old fashioned rakes. On such emergencies every individual within reach is put under requisition, women as well as men; and even the children old enough to manage a rake, are called from the neighboring school house, to engage in the scramble. On such occasions, when a boy, we have thus toiled till our hands were covered with blisters. We shall never forget it. The necessity for such panics and hardships is mostly superseded. The invention of the horse-power rake is among the most important of agricultural facilities for saving labor. Rarely will it happen, where one of these rakes is on a farm, that there will be any necessity for the former efforts alluded to in protecting mown hay against damage from rain. Among the different horse rakes, we believe the Revolving Rake is the best; and, a man and boy in a day, can rake up the hay of fifteen or twenty acres.



REVOLVING HORSE RAKE.

RHINOCEROS. The rhinoceros is an animal which ranks next to the elephant, in point of size as well as strength; it is usually found to be about twelve feet long from the tip of the nose to the insertion of the tail; the same in circumference, and about seven in height; the legs not being near so long as those of the elephant. It is difficult to convey an accurate idea of this extraordinary animal, from the singular appearance produced by the skin, which lies upon the body in large folds, and looks like different coverings of shell, of a dirty brown color, and so callous as to turn a cimeter's edge. From the snout there issues a curved horn, which sometimes grows near four feet in length, with which it is a match for the fiercest animals, though it is

never the first to commence an attack ; the form of the head resembles that of a hog ; but the ears are larger, and stand erect ; the eyes, though small, are bright and piercing ; and the legs remarkably strong and thick.

RICE. This plant is cultivated in many parts of the East, in South Carolina, in America, and also in Spain, Italy, and Piedmont. It is a plant that grows to the height of about two feet and a half, with a stalk not unlike that of wheat, but fuller of joints, and with leaves resembling that of the leek. It branches out into several stems, at the top of which the grain grows in clusters, and each of them is terminated with an ear or beard, and enclosed in a yellow rough husk. When stripped of this, they appear to be of an oval shape, of a shining white color, and almost transparent. Rice in China is the most important crop. On it the people mainly subsist ; and of course the utmost attention is paid to its culture. It is also an important crop in some parts of our own country. The cultivation in South Carolina is very successful on rich river bottoms, the yield being forty bushels or more to the acre, and one hand can manage five acres. For the process of cultivation, see the Southern Cultivator, one of the best journals in the country.

RIVER HORSE, or HIPPOPOTAMUS. Probably the Behemoth mentioned in the book of Job. This surprising animal inhabits the rivers and lakes of Africa, living, as occasion requires, either in the water, or upon the land. He is twice the size of the largest ox. He has four legs which are short and thick ; his head is near four feet long, and nine feet round ; his jaws are about two feet wide ; and his teeth above a foot in length. His skin, generally, is so thick that a sword will not pierce it, and even a bullet can hardly enter it ; and his voice is loud and horrible. They chiefly keep at the bottom of deep lakes and rivers, especially in the day time, catching fish and feeding upon them. Sometimes, however, they walk upon the shore, and sometimes invade the fields of standing corn ; whence they are driven by the cries and shouts of the people who inhabit the country, and keep watch against this fearful enemy. This animal is remarkably constructed for his manner of walking. He is furnished with a cloven foot, and, above the pastern, with two small horny substances, which bend backward as he walks, so that he leaves on the ground an impression which seems to have been made by the pressure of four paws to each foot. By this peculiar structure of his feet he is kept from sinking, at the bottom of lakes and rivers, and upon oozy shores.

ROADS. The Romans were distinguished by the vast extent and solid construction of their roads, of which several thousand miles were made in Italy alone ; while every other country that was brought under their sway was more or less intersected by these excellent highways. The solidity of their construction was fully equal to the boldness of their design a fact proved by the existence of many that

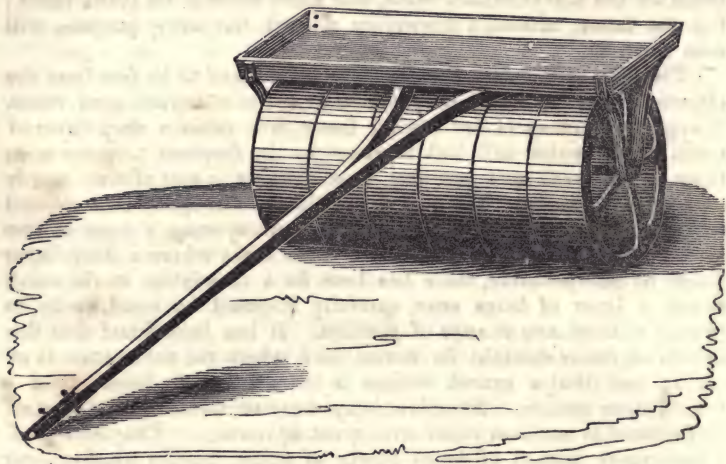
have borne the traffic of nearly two thousand years without material injury. The Romans always gave a firm foundation to their roads, by ramming down a layer of small stones and broken bricks; on this layer a pavement of large stones was laid, either to fit closely around one another, or cemented into a hard and firm causeway. In our own country, as yet, but little has been done in the construction of public highways on scientific principles. Some attempts have been made for the Macadamized roads, and more recently for plank roads; but the latter, although answering a good temporary purpose, will soon wear out.

The plan of M'Adam has generally been found to be free from the objections most common in previous efforts to construct good roads. His plans, as many of our readers know, is to make a deep layer of small stones which will lock together, by the frequent pressure upon them, into a hard and compact mass, forming a sort of crust nearly impervious to water. The quantity of these small stones must depend on the quality of the ground beneath; in many cases a layer of two or three feet has been required. In some cases where a deep layer would be indispensable, there has been for a foundation to the small stones, a layer of large ones, carefully disposed by hand, so as to remain without any change of position. It has been found that this affords an easier draught for horses than where the substratum is of earth; and that a gravel surface is more trying to horses than a broken stone surface. Stone tramways have occasionally been applied in England to common roads with great advantage. They consist of wheel-tracks formed of large blocks of stone, usually granite, over which the wheels roll smoothly, while there is an intermediate broken stone road for the horses. Iron tramways have sometimes been used. It is supposed by many that good tramways, and even Macadamized roads, may be constructed so as to answer the purpose for locomotives. This has been attempted in France, and with a prospect of satisfactory results.

ROLLER. Rollers are important implements in modern farming, and are fast coming into general use. They crush all the sods and lumps that remain on the top of the ground after the harrow has passed, and force down small stones level with the surface. They render the field smooth for the cradle, scythe, and rake, press the earth close about the seed, and secure a more sure and quick germination. On light and sandy soils they are invaluable, and in all cases their use has greatly increased the product. Much benefit is undoubtedly found in compressing the surface of light soils, by preventing the escape of those gases from the manure so essential to vegetation, and which are so rapidly extracted by the sun and winds.

Great advantage is gained by rolling early in the spring, while the ground is soft. Clay lands, by heaving, pull to pieces and displace the roots of grain and grasses sown the previous autumn, and the

heavy roller presses the roots and the earth together in their proper position, when vegetation goes on again, and thus, in a measure, prevents what is termed winter killing. They are variously made of wood, stone, and iron. Those of iron are most durable; those of stone may occasionally become impaired by the loss of fragments where there had been old seams; and those of wood are always liable to decay. The one represented in the cut is entirely of iron, except the



ROLLER.

tongue and box, which are of wood. Twenty four inches in diameter is a good size; but are sometimes six inches larger, and then again six inches smaller. The rollers are in separate sections, each one foot long, placed on a wrought iron arbor on which they turn independently of each other, thus turning without much friction, and leaving the ground smooth. The box is attached to receive stones, either to increase the weight of the implement, or that such as are casually found on the surface may be removed. Rollers are made of any size or weight desired; and none can be obtained better than those manufactured by A. B. Allen and Company, New-York.

ROOT. The root is that part of a plant by which it attaches itself to the soil in which it grows, or to the substance on which it feeds, and is the principal organ of nutrition. The roots by which trees and shrubs are supported, appear to be merely elongations of their stems, subdivided into numerous branches, and terminating in minute radicles, or absorbents. These extremities resemble the fibrous roots of grasses, and are subservient to precisely the same ends, for the main body as well as its large branches, serve only to convey towards the leaf the nourishment which its minute extremities have derived from

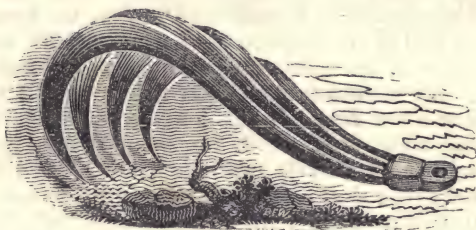
the earth. Like the stem to which it is attached, the former is composed of concentric circles corresponding to the age of the tree, and contains the same vessels which pervade the other parts of the vegetable texture ; but the extreme radicles are always of annual growth, and the delicacy of their texture renders it difficult to transplant vegetables after they are formed. The proper period, therefore, to remove trees and shrubs, is late in autumn, after the radicles have ceased to absorb moisture from the earth, or in the spring, before a new system of absorbents is formed. It may be done with safety in mid-winter, when the whole energies of the vegetable are torpid, but during the season of vegetation, which requires the constant abstraction of nutriment from the earth, it is a work of more difficulty and danger.

The analogy between the ascending stem and the branching root, is more close and better established, than at first view we should be prepared to expect, and their only difference is derived from the different organs with which they are connected. This is established by an experiment which has frequently been performed, and may without difficulty be repeated. A shrub was bent to the horizon in such a manner that half of its branches were covered with earth, and a similar proportion of its roots were exposed to the action of air and light, without any protection but that of a thin coat of moss, which was removed in a few days. In this position the shrub remained for a considerable while, after which the remainder of the stem was buried beneath, and the whole root raised about the surface of the ground. Thus reversed, it continued to grow, the former roots being crowned with leaves, and in a few years decorated with flowers, while the former branches put forth radical fibres, whereby the shrub derived its nourishment from the earth.

Bulbs are by some writers classed with roots, while others regard them as an interesting variety of subterranean bud. Certain it is that they enclose the embryo of future plants, till the period of their evolution arrives, and in this respect they perform the office of buds. Many of them are also composed of concentric scales, nearly allied to those which secure the tender leaves and flowers of northern trees, from the cold of the winter to which they are exposed. But it is equally true they bear a close analogy to the tuberous root, and whatever opinions we adopt respecting their nature and rank, whether we class them with roots or with buds, the plants to which they are attached will always be regarded with peculiar interest. They are amongst the earliest harbingers of spring, and certainly the most splendid ornaments of the garden. Among them are the lily, snow-drop, tulip, hyacinth, with about forty more interesting plants, equally deserving the fostering care of the cultivator.

All these varieties of roots are formed to secure the same end, to fix the plant securely in the earth, to supply it with food, and to preserve its vital though dormant energies, at a season when they could

not be safely aroused into action ; and at the same time, to secure its resources against the vicissitudes of moisture and dryness to which the vegetables of many countries are perpetually exposed. And a small share of attention to the structure and form of each variety, will enable us to pursue the best mode of cultivation, and to designate the quality of the soil to which they are respectively suited. Of those which descend deep into the earth, there are several varieties, and all require to have the ground deeply furrowed, before they can be cultivated with advantage. Barren and thin soils are best suited to the wide spreading roots, which creep extensively on their surface ; dry and sandy plains are adapted to those which penetrate deep for nourishment, and are supplied with bulbs for its preservation, or with downy radicles for its abundant absorption. No one can advantageously introduce a new plant, till by the examination of its various organs, he has learned to what situation it is best adapted, nor can he be a successful florist, who is not at the same time an observing botanist.



ROOT-PULLER.

ROOT-PULLER. One of the most simple and useful contrivances on a farm that has not been fully subdued, is the Root and Bush Puller. The cut annexed will convey an idea of the principle on which it becomes so powerful. Let it be attached to bushes, clumps of roots, and bogs for the purpose of pulling them out of the ground. It is made, with two, three, or four claws. These are hooked to the bush close to the ground, and to the root wherever it may be well secured ; the oxen or horses are attached to it by a chain, when the bush and roots are easily hauled out. It will do the work of half a dozen men in clearing and grubbing. It may be found at the large agricultural warehouses generally.

ROTATION OF CROPS. It has been found from experience that a repetition of the same crops in succession has a peculiar effect on the soil, so that if grain of the same nature be sown year after year in the same ground, it will not produce the same return of seed, even when abundantly manured. It is the formation of the seed which principally causes the deterioration of the soil ; for if the crops be fed off in a green state, or mown before the seed is formed, the same may

be safely repeated, and no diminution of the plant is apparent. However judiciously the land may be manured, it is not practicable to raise a crop of wheat or clover, or of many other plants on a soil which has shown that, as farmers say, it is tired of the crop; but clover grows well after wheat, and wheat after clover, so that the same effect is not produced in the soil by these two crops. In all countries where peculiar attention has been paid to agriculture, the most advantageous succession of crops is generally known; and certain general principles are commonly admitted as fully established.

In order to find the crops which may advantageously succeed each other in rotation, many circumstances must be taken into consideration. First of all the quality of the soil, and its fitness for particular crops; next the wants of the farmer and his family, and the maintenance of the stock required to produce a sufficient supply of manure; and, next the particular market which lies open to him. That which forms the food of man is always the principal object in cultivation; and, in our climate wheat and maize or Indian corn may be considered the grains that should have prominence in each rotation among our agriculturalists. Rye, barley, and oats, either as substitutes for them, or for the feeding of stock, are not to be omitted. Next to grain comes meat, chiefly beef, mutton, and pork, of which the consumption increases with the wealth of a nation and the advance of its agriculture. Wheat, maize, and meat are therefore the primary objects with every farmer; and he who can raise most wheat and Indian corn, and fatten most oxen, or sheep, or pigs, will realize the greatest profit. The rotation, therefore, depends on all these considerations combined.

RUST. In Rural Economy, a distemper incident to corn, and generally called mildew. The ancients generally thought that it came from heaven, being ignorant of its true cause. Virgil gives this up as an incurable distemper, and tells the farmer that if his corn is blighted he must live upon acorns, not supposing that any remedy could be devised for such a distemper. Wheat is blighted at seasons, first in the blossom, and then its generation is prevented, many of the husks being empty in the ear, and the rudiments of the grains not impregnated; secondly, wheat is blighted when the grains are brought to maturity; and in this case they become light and are of little value for making of bread, having scarcely any flour in them.

Under this term of "rust" may, perhaps, most properly be arranged, and included, that sort of destructive affection of grain, which is caused by the funguses and parasitical plants, which fix themselves on and attach themselves to, the stems or other parts of it, so as to diminish, intercept, or destroy its nutritive properties and qualities. The injury done in this way is often more dreadful than that from any of the other causes, as whole fields have been known to be utterly destroyed, so as not to contain a single grain of wheat in the ear, and

at the same time, the straw rendered totally unfit for fodder, possessing neither strength nor substance in it. The evidence of different places fully confirm the existence of fungi, as injurious in this manner; as from some it is stated, that as the wet weather continued, the rust of fungus made a rapid progress from the ear downwards, until, in many instances, it covered the stem from the ear, as far as it was unsheathed. From others it is said, that the rust or fungus prevented those grains which the maggot had not destroyed from being perfected, in a greater or less degree. From others still it is asserted, that these parasitical plants multiplied so much on the straw, and on the husk and chaff of the ears, that in many cases whole fields put on an universal blackened, rusty appearance. From other different persons, various other circumstances of this nature are also related to be met with.

The best means of preventing and removing affections of this nature in this sort of grain crop, are supposed to be those of cultivating only the sorts of wheat which are the hardiest in point of quality, and the least liable to disease; the sowing of the wheat earlier than usual in the season; the introduction of earlier varieties of it; the giving of a sufficient quantity of seed; the draining of the land where it is inclined to be wet; the rolling and treading of the land by live stock immediately after sowing; the use of sowing different sorts of saline substances as a manure; the proper regulation and improvement of the course of crops; the change of seed, by bringing it fresh from other countries; the extirpation of the diseased stems, stalks, or blades early in the season, and the instantly cutting down of the crop when it is decidedly affected.

SADDLE. A seat upon a horse's back, contrived for the convenience of the rider. The ancient Romans are supposed not to have made use of saddles and stirrups, and it is thought that they did not come into use till the time of Constantine the Great, A. D. 340, as appears from the Greek historian, Zonaras, who (through his whole history) makes no mention of a saddle for a horse, before such time as Constans, attempting to deprive his brother Constantine of the empire, made head against his army, and entering into the squadron, where he himself was, cast him beside the saddle of his horse.

SAGO. Sago is a simple brought from the East Indies, of considerable use as a restorative diet. It is produced from a species of palm tree, growing in the East Indies. The progress of its vegetation in the early stages is very slow. At first it is a mere shrub, thick set with thorns; but, as soon as its stem is once formed, it rises in a short time to thirty feet, is about six feet in circumference, and imperceptibly loses its thorns. Its ligneous bark is about an inch in thickness, and covers a multitude of long fibres; which, being interwoven one with another, envelope a mass of a gummy kind of meal. As soon as this tree is ripe, a whitish dust, which transpires through the pores of the

leaves, and adheres to their extremities, proclaims its maturity. The Malays then cut it down near the root, divide it into several sections, and then scoop out the mass of mealy substance, which is enveloped by, and adheres to the fibres; they dilute it in water, and then pass it through a straining bag of fine cloth, to separate it from the fibres. When this paste has lost part of its moisture, by evaporation, the Malays throw it into earthen vessels, of different shapes, where they allow it to dry and harden. This paste is wholesome nourishing food; the Indians eat it diluted with water, and sometimes baked or boiled. A jelly is sometimes made of it, which is white and of a delicious flavor. An inferior kind of Sago is made in the West Indies from the pitch of the areca.

SALIVA. The saliva which is secreted by peculiar glands, and which flows into the mouth, is a clear viscid fluid, without taste or smell. It has generally a frothy appearance, being mixed with a quantity of air. Saliva has a strong attraction for oxygen, which by trituration it communicates to some metallic substances, as mercury, gold, and silver. When saliva is boiled in water, albumen is precipitated, and when it is slowly evaporated, muriate of soda is obtained. A vegetable gluten remains behind, which burns with the odor of prussic acid. Saliva becomes thick by the action of acids. Oxalic acid precipitates lime. Saliva is also inspissated by alcohol. It is decomposed by the alkalies; and the nitrates of lead, of mercury, and the silver, precipitate muriatic and phosphoric acids. By distillation in a retort, it froths up, affords nearly four-fifths of its quantity of water almost pure, a little carbonate of ammonia, some oil, and an acid. What remains behind consists of muriate of soda, phosphate of soda and of lime.

SALT. Or the muriate of soda, as it is termed by chemists, is one of the most abundant productions of nature, and is found in vast quantities in its native state. The waters of the ocean owe their saltiness to it; it is found in a number of mineral springs; and it forms immense strata in the bowels of the earth, or rising on the surface, even to the height of mountains. According as it is produced from these sources, it is named sea salt or rock salt. Rock salt is solid, hard, and more or less transparent, of a white, gray, or reddish color, sometimes of a bright or deep red or yellow, and more rarely with spots of blue. Its fracture is foliated or fibrous; generally it is massive, but sometimes crystalized in cubes, and its fragments are always of a cubical form. The colors are supposed to depend on the oxide or muriate of iron. In general it is pure, and hence its taste is purely saline; but sometimes it is bitter, from the presence of foreign salts. There are immense mines of it in different countries.

It has been stated that salt is superior for preserving fish and meats in proportion to its weight; and, that American salt being considerably heavier than Liverpool salt, is superior to it. This comparative

difference of weight will appear from the following account of samples of salt, manufactured at the Onondaga works, in New York. These samples were of four different kinds. The coarsest is of the most perfect whiteness and purity, and weighs seventy-four pounds to the bushel. It is made by evaporating the salt water in the sun, in large wooden vats. It is almost as coarse as Turk's Island salt. The second quality is about as coarse as St. Ubes' salt, but entirely free from all impurity. It weighs sixty-six pounds to the bushel, and is made by boiling the brine in wrought iron pans. The third quality is a little finer than that called Liverpool coarse salt, and a bushel weighs fifty-five pounds. (The Liverpool weighs only fifty pounds to the bushel.) The fourth kind is very fine and clean table salt, of the very best quality. The water of the salt springs at Salina, is said to yield four times as much salt as the water of the ocean. It probably proceeds from some vast body of rock salt in the bowels of the earth. In a memoir on the Salines, or salt springs, and wells of the Kenhaway county, in Virginia, it is stated among other particulars, that at the salt works, along the great Kenhaway, there are about sixty furnaces in operation, producing from ten to twenty thousand bushels annually; and furnishing the principal supply of this essential article to the States of Kentucky, Ohio, Indiana, Illinois, the west part of Tennessee, the northern section of Alabama, and the western counties of Virginia.

The quantity of salt used is immense. In all culinary processes it is indispensable. It is as conducive to health as it is agreeable to the taste. One could scarcely live without it. Nor is it less necessary to other animals than to man. There should be a strict regard to its being given to oxen and cows, sheep and horses, without any long intervals. They will thrive the better for it. And it is equally valuable for hogs, especially upon being fattened. Salt is also used in agriculture, particularly in forming composts. However, if used without regard to its chemical qualities, the effects of it may sometimes be baneful rather than beneficial; for it is known to all that to certain kinds of vegetable life it is very destructive. If applied to an asparagus bed, while it destroys grass and certain weeds whose roots are near the surface, the growth of the asparagus is promoted. In general its effects are said to be better on good soils than poor ones. If cast about trees, the saline properties may indeed destroy insects; but, if the quantity has been too large, so as to penetrate to the mass of the roots, the trees have likewise now and then been destroyed. Those who use salt in agriculture should be furnished with a directory for it, either Brown's American Muck Book, or Dana's Muck Manual.

SALMON. A celebrated fish belonging to the trout genus, which inhabits the northern seas, and ascends the rivers in spring for the purpose of depositing its spawn. The excellence of its flesh is well known, but it varies somewhat in different waters. In certain dis-

tricts, the abundance of this fish forms a great source of wealth to the inhabitants, and it often forms a chief article of sustenance. The salmon inhabits the European coasts, from Spitzbergen to Western France, but is never seen in the Mediterranean. On the Western shores of the Atlantic it is found from Greenland to the Hudson, but is exceedingly rare in the latter river, and never penetrates farther south. It ascends the St. Lawrence to Lake Ontario, and enters the tributaries of that lake; but the fall of Niagara presents a barrier to its farther progress into the continent. In the North Pacific the salmon again makes its appearance, and frequents, in vast numbers, the rivers of Northwestern America, Kamtschatka, and Eastern Asia.

A cold climate and clear water seem to be most congenial to its constitution. The salmon grows to the length of four, five or six feet, and usually weighs twelve or fifteen pounds. The body is elongated and compressed; the color silver gray, with spots; the head of moderate size, and the upper jaw rather the longest. Almost all parts of the mouth, and even the tongue, are furnished with pointed teeth, as in the other trouts, and like them, it has an adipose fin upon the lower part of the back. All the trouts are voracious and carnivorous, and in general seek the purest water. As soon as the ice melts, the salmon enters the mouths of rivers, and, as has been ascertained, almost always of those which gave them birth. They are easily frightened, either by a sudden noise or floating timber, and on such occasions sometimes turn aside from their course and return to the sea. When farther advanced, they make the most determined efforts to surmount rapids and cascades, and will leap a fall of twelve or fifteen feet in perpendicular height. If alarmed, they dart away with such rapidity that the eye can scarcely follow them.

When the young are about a foot in length, they descend the rivers and take refuge in the ocean. Late in the following spring or in the beginning of summer, and after the old ones have ascended, the young again enter the rivers, and are then about eighteen inches in length. They again seek the ocean on the return of frosts. At two years old, the salmon weighs six or eight pounds, and requires five or six years to attain the weight of ten or twelve. The salmon fishery is one of the most important branches of business in the north of Europe. Immense quantities of this fish are taken every year, and form a considerable accession to the general mass of nutriment. The flesh is bright orange, but, though delicious to the taste, and very much sought after, is difficult of digestion. Formerly the New York market was supplied with fresh salmon from the Connecticut river; but, since the erection of mill dams and other obstructions, the fish have become scarce there, and now are brought almost exclusively from the state of Maine, packed in ice.

SAMP. A name given to a sort of bread made of the maize, or Indian corn. They first water the corn for about half an hour, and

then beat it in a mortar, or grind it in a handmill ; they then sift out the flour, and winnow the husks from it ; they then mix this into a thin paste with water, and bake it in flat loaves, which they call samp loaves, or samp bread. Beside this, they have another dish prepared of this corn, which they esteem a great delicacy, and call by the name of samp, without the addition of loaf or bread. To make this, they only bruise or grind the corn to the size of rice, and then winnowing away the husks, they boil it gently till it is thoroughly tender, and then add to it milk and butter and sugar ; this is not only a very wholesome, but a very pleasant dish. It was the first diet of our planters when newly settled here, and is still in use as an innocent food in sickness as well as health. The Indians, who feed on this sort of food, are found never to be subject to the stone, and to escape several other painful diseases. The English have found a way of making a very good sort of beer of the grain of Indian corn ; they do this either by using the bread of it, or else by malting it, as they do their own corn. When they make the beer of the maize bread, they break or cut it into lumps as big as a man's fist ; they mash these in the same manner that we do malt, and boil up the wort in the same manner, either with or without hops.

SAND. The name of sand is given to all mineral matter that exists in minute detached grains, and is denominated from the prevailing substance, as siliceous sand, iron sand. Sand is generally formed from the disintegration of hard stones or rocks by the agency of water, and the particles of siliceous stones, possessing a greater degree of hardness than most other kinds. The greatest part of the sand which exists on the seashore, or is spread on the surface of the earth, is siliceous. Argillaceous stones, or calcareous stones intermixed with alumine, when reduced to minute parts, form a kind of paste or mud by intermixture with water, the particles uniting or cementing together as the mixture becomes dry. When a bed of siliceous sandstone rises to the surface, the particles become separated by the action of the atmosphere and other causes, and form a loose sandy soil ; sometimes so destitute of mixture with other earths, as to be entirely unfit for vegetation.

The surface of the globe presents immense countries covered with sand, as the deserts of Africa, and those of Northern Asia. According to Patrin, a French mineralogist, the great rivers which he has seen in Northern Asia, the Irtisch, the Ob, and the Yenissey, have their beds at present surrounded by sandy deserts, which are in many parts from four to five hundred feet above the level of the plains. These masses of sand, which cover such an immense extent, were formed from the ruins of the higher parts of central Asia, brought down by inundations. Extensive tracts of cultivated ground are sometimes converted into sandy deserts ; the process is taking place at present, and has been well described by Cuvier. During very high

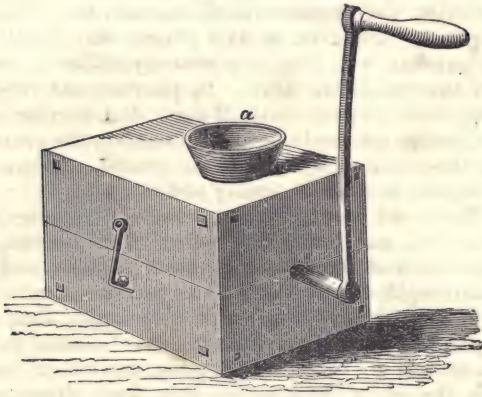
winds, the sand on the seashore is driven inland, covering the ground to a certain distance, and leaving an elevated ridge at the further boundary; succeeding winds blow this forward, and at the same time bring fresh sand to supply its place.

In the sixth volume of the Transactions of the Irish Academy, an account is given of the encroachment of the sand over some parts of Ireland. Trees, houses, and even villages, have been covered or surrounded during the last century. The roofs, still rising above the waste, attest the period and the progress of desolation. The loose sands of Egypt are thus spreading over the plains that border the Nile, and burying the monuments of art, and the remembrance of former cultivation. Palmyra, in Asia Minor, that once supplied an abundant population with food, now scarcely affords a few plants to the camel of the wandering Arab. By planting and irrigation, man can fix limits to the moving wastes of sand; but despotic power, more destructive than the winds of the desert, unnerves the arm of industry, and dashing the cup of enjoyment to the ground, consigns flourishing and fertile districts to eternal sterility and solitude.

SAP. The water in which the roots of a plant are immersed is gradually absorbed, and during the season of vegetation, it ascends through the vessels of the stem with great rapidity, and with great force, but still limpid, tasteless and inert, possessing only the properties of the pure water from which it was derived. This fluid constitutes the sap. In some plants, and at certain seasons, it is particularly abundant. If wounded in the spring, previous to the expansion of their buds, the sap of the vine, maple or birch, flows profusely, but at midsummer, after the leaves are fully developed, the "tears of the vine" are comparatively few. It is not unusual, in this country, to collect one or two hundred pounds of sap from a single maple of ordinary size, and we are told that a birch tree, when wounded, has been known to discharge a quantity equal to its own weight. Yet, at midsummer, when the noble energies of the vegetable are exerted, these trees rarely bleed at all. The flowing of the sap is usually regarded as the effect of its accumulation in the vessels, at a season when there are no leaves through which, in the form of vapor, it may escape. Dr. Smith, however, regards it as the effect of heat, operating on the irritability of the plant, and he considers it as the first step towards the revival of vegetation from the torpor of winter. To this hypothesis there are very serious objections, for many trees bleed in the autumn after the leaves begin to fade and fall, as well as in the spring before the buds are open.

SAUSAGE-MEAT CUTTER. This machine, by the labor of one man, is capable of cutting readily from eighty to one hundred pounds of meat per hour, the person feeding the machine; thus leaving the mass cut sufficiently fine and uniform. The process is simply putting in the meat at the small end of the cone, through the hopper,

and, by turning the crank, the meat is passed round, through and between the knives, and forward to the large end of the cone, and discharged through an aperture in the bottom at the large end of the cone, or opposite the hopper. Cutting meat for sausages by hand, with a knife, as formerly done, was an arduous and disagreeable labor; but, with one of these machines, and a sausage stuffer, that will do the work of five or six men, sausages may now be manufactured with the greatest imaginable facility and convenience. No family should be without them.



SAUSAGE-MEAT CUTTER.

SAVING MANURE. Many persons do not seem to be aware that a valuable portion of manures can escape in the form of steam and gases generated by the heat and decomposition of animal and vegetable matters; or that another valuable part may be washed out by rain and snow water, while a moiety is frequently lost in the urine that passes through a leaky floor. Every agriculturist should make it a leading object to guard as much as possible against these losses; to effect this, the barn cellar is probably the best plan yet devised; for here large quantities of peat, muck, with other valuable absorbing materials, can be stored in summer and autumn for daily mixing with the fresh dung during winter. The temperature of the whole mass can be easily regulated so as to guard against loss by excessive fermentation; the muck absorbs the urine, and no drenching rains wash out the soluble portions of the contents of the cellar, but all is saved in the best possible condition to be carted out and ploughed into the soil.

But as few farmers, compared with the many, have cellars under their barns and stables, sheds answer a very good purpose for sheltering winter-made manure. In such cases the hovel floors should be

made water tight, and sufficient quantities of dried muck, loam, clay, and litter, should be stored for the purpose of daily littering the floors, both for the comfort of the cattle, and absorbing the urine ; but during the winter, where such a practice is pursued, the contents of the hovel, if thrown loosely under sheds, are often liable to heat and "firefang," unless trodden down hard ; this can be done by keeping a few hogs upon the manure, or suffering young cattle or sheep to go under the sheds. As the manure does not freeze when thus treated, it can at any convenient time during the winter, be sledded out and placed in large heaps, near where it will be wanted for use ; thus saving much heavy cartage over wet roads and across soft fields in the busy season of spring. In this matter I speak from experience.

The agricultural value of the urine of a stock of cattle, does not appear to be fully appreciated by farmers generally, if we may judge from the recklessness with which a large portion of it is suffered to run to waste on many farms during the winter season. Carefully conducted experiments made some years since, by an intelligent farmer, Charles Alexander, near Peebles, Scotland, proved that while fourteen head of cattle made six loads of solid manure, the urine voided by them in the same time, would saturate seven loads of loam, rendering it of equal value, load for load, with the solid excrements. "He tried this experiment for ten years, and had indiscriminately used in the same field, either the rotted cow-dung or the saturated earth ; and in all the stages of the crop, he had never been able to discover any perceptible difference ; he found that his compost lasted in its effects as many years as his best putrescent manure." Said Mr. Coleman, "conclusions of vast importance are deducible from this statement. They speak volumes of instruction ; and if we are willing to learn, they must lead to a very material alteration in the construction of our barns."

SAW MILLS. In early periods, the trunks of trees were split with wedges, into as many and as thin pieces as possible ; and if it was necessary to have them still thinner, they were hewn on both sides to the proper size. This simple and wasteful manner of making boards has been still continued, in some places, to the present time. Peter the Great, of Russia, endeavored to put a stop to it, by forbidding hewn deals to be transported on the river Neva. The saw, however, though so convenient and beneficial, has not been able to banish entirely the practice of splitting timber used in building, or in making furniture and utensils, for we do not speak here of firewood ; and indeed it must be allowed that this method is attended with peculiar advantages, which that of sawing can never possess. The wood splitters perform their work more expeditiously than sawyers, and split timber is much stronger than that which has been sawn ; for the fissure follows the grain of the wood, and leaves it whole ; whereas the saw, which proceeds in the line chalked out for it, divides the fibres,

and by those means lessens its cohesion and solidity. Split timber, indeed, turns out often crooked and warped; but in many purposes to which it is applied this is not prejudicial; and these faults may sometimes be amended. As the fibres, however, retain their natural length and direction, thin boards, particularly, can be bent much better. Thus a great advantage in making pipe staves, or sieve frames, which require still more art, and in forming various implements of the like kind.



SAXON BUCK.

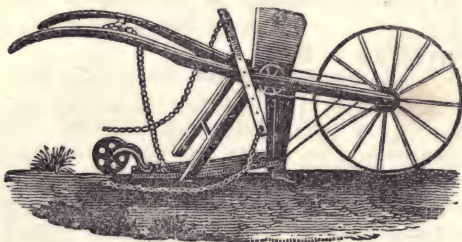
SAXON SHEEP. The invaluable properties of pure Saxon wool, and the demand consequent for its manufacture into fabrics, the fineness of which the world has never before produced, is the cause of the high value of Saxon sheep, and their spread over so large a portion of Europe, and of their introduction to our own country. No other breeds are so highly prized on the continent of Europe, and none which command such enormous prices. Individual uncontaminated rams, often bring from one hundred to two hundred and fifty dollars; and a whole flock was purchased in Germany, a few years since, destined for Russia, for which an average price of five hundred dollars was paid; and, on the authority of Mr. Spooner, it has been stated that rams have been sold there at the incredible prices of one hundred to near three hundred guineas per head. And in our own country, for rams, there have been sales at prices approximating five hundred dollars each.

Mr. J. A. Taintor, of Hartford, (Conn.,) has imported some of the best Saxon sheep known in the United States. The wool of his sheep is of the finest and best quality; and the animals have more size, and, it is believed, better constitutions, than belonged to previous importations. It may be affirmed that his patriotic services in such laudable efforts to improve the stock of this valuable animal deserves public commendation. Of his importation there was a three year old buck, which weighed one hundred and fifty pounds; and he was admirably well built, and had one of the best of fleeces. Mr. Taintor is a gentleman of wealth, and of high intellectual bearing, and his personal acquaintance with the best wool growers of France, Spain, and Germany, enabled him to be thus successful in his selection. In making the selection, he had the aid of Baron de Spreck, second to no other man in judgment on such a subject.

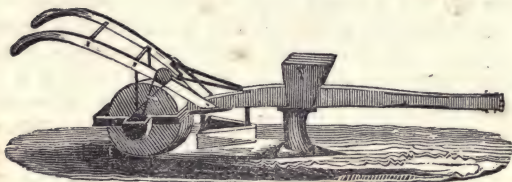
SCORPION. Is an insect of this description, and is frequently mentioned in the Scripture, but scarcely ever without being associated with representations of malevolence and mischief. Among all the insect tribe, the scorpion, indeed, is the most terrible; its figure is hideous, and its sting is generally fatal. This creature, which, of all the insects without wings, is the largest as well as most formidable, somewhat resembles a lobster in shape, although beyond comparison more horrible. Of this dangerous insect nine different species have been enumerated, and all of them remarkable for their malignity. Indeed there are few animals more dreadfully mischievous than the scorpion. As it frequently takes refuge in houses, it is found to be a dangerous inmate, and often stings those among whom it resides. In some parts of Italy, and also in the south of France, it is one of the greatest pests that torment mankind; but as in those countries its sting seldom proves mortal, the malignity of the European scorpion is trifling in comparison of that which the natives of Africa and the East experience from those bred in their climates. In Batavia, where they grow to a foot in length, it is scarcely possible to remove any furniture without being in danger of being stung by these poisonous animals. Bossman also informs us that on the Gold Coast in Africa they are often found larger than a lobster, and that their sting is inevitably fatal. In Europe their size does not exceed two or three inches, and those who are stung generally recover.

The malevolent disposition of the scorpion has been proved by a number of experiments, which show that no animal in creation is endowed with so irascible a nature. Its fierceness is dangerous not only to all other creatures that approach it, but also to its own species; for scorpions are the most cruel enemies to one another, which is a happy means of preventing the too great increase of their numbers, as whenever two of them meet, a combat immediately commences, and they never cease fighting till one of them be destroyed. Maupertius put a hundred of them together in a vessel, and they scarcely came into contact

before they began to exert their rage in mutual destruction. Nothing was to be seen but universal carnage; and in a few days there remained only fourteen, which had killed and devoured all the rest. He also enclosed in a glass vessel a female scorpion big with young, and she was observed to devour them as soon as they were brought forth; only one of the number escaped the general destruction by taking refuge on the back of the old one; and this parricidal offspring of an unnatural mother soon avenged the cause of its brethren by killing its cruel parent. These observations demonstrate the propriety of the scriptural metaphors, which exhibit the scorpion as the lively emblem of finished malignity.



SEED SOWER.



CORN PLANTER.

SEED SOWER AND CORN PLANTER. All implements that can well perform by machinery and horse-power the labor required on a farm, and heretofore done by hand, add much to the elevation of agriculture. Such implements are as important to the farmer as improved mechanism and steam are to the mechanic. To save labor and create dispatch are the great objects of attainment in rendering any occupation productive of profit. If a farmer can be enabled to accomplish in one day what he had formerly done in six days; or if he has become enabled to effect by machinery and horse power aided by his own hands, what others do in the same time by the occupancy of six men, it is clear that he is receiving far better remuneration for his services than they are; probably three times as much. To sow small seeds, especially in field culture, such as ear-

rots, turnips, and parsnips, is a most tedious process ; slow as well as irksome, from the stooping position of the body in doing it ; and, although the same objection does not so fully exist in the planting of Indian corn, still in that, where large fields are under culture for it, the aggregate of labor in the operation is a weighty one.

So great was the object to be gained in doing this work by machinery, it was to be expected that our ingenious mechanics would turn their attention to it. Such has been the fact. Several implements, in different parts of the country, more or less perfect, have been produced ; each new one designed to obviate some supposed defect in previous ones. Thus every new aspirant in this department of agricultural improvement has the benefit of what his predecessors have done. It now seems that the Seed Sower and Corn Planter has become so perfect it would be visionary to attempt any additional alterations for the better. The largest of them, with two horses and a man will plant towards twenty acres of corn in a day ; smaller ones, with one horse, about half as much. The latter are preferable for common farmers, because they afford all the speed desirable. Emery's Seed Sower, called also the Albany Corn Planter and Seed Drill, being made at Albany, N. Y., with one horse will plant one acre per hour, with rows three feet apart. In using it the operator takes the handles as with a wheel-barrow, and walks erect. The machine making its own furrow, counting and measuring its own quantity of seed, deposits it in hills or drills at pleasure, and at any distance apart, covering the seed after it is dropped, and compressing it after it is covered, by means of a roller, and doing the whole at one and the same time. It would be difficult to imagine how it can be more complete, unless one can impart to it the locomotive power of the horse or steam engine, which probably will not be attempted in our day. It is believed that every farmer, planting no more than five or six acres, with Emery's Planter, will save labor enough in a single season to pay for it.

SEEDS, DISPERSION OF. By the currents of the ocean, the seeds of West India vegetables are frequently conveyed to the coast of Norway, where they refuse to grow merely in consequence of the unfavorable climate in which they are deposited. In this way the plants of Germany find access to Sweden, and those of Spain and France are scattered over the shores of England. In these cases the difference of climate is not so great as to prevent the growth of seeds which have thus emigrated from their native country. On the banks of the Connecticut we frequently meet with plants which probably descended with its current from the mountains among which it takes its rise ; plants whose seeds ripened in Canada, and emigrated to a more temperate climate.

Winds also contribute to the dissemination of seeds. We have seen how well many of them are adapted to expose a large surface to

its action, and we have often observed them sailing through the air, in pursuit of a new and distant home. It is scarcely necessary to refer to the winged capsules of the maple and the ash, which, in connexion with the seeds, are propelled by the wind to a distance from their respective trees. Nor is it necessary to say how effectually the same object is secured by the winged seeds of the catalpa and pine, which, in a similar way, are elevated and propelled through the air.

Some seeds are enclosed in an inflated calyx, more resembling a balloon than a sail, but equally effectual in diffusing over the globe the seeds which they enclose. But the feathery crown which invests the seeds of compound flowers affords a more beautiful specimen of mechanism than any of these, and it is brought into operation through the agency of dry air at the very moment best suited for their dispersion. Aided by this, the erigeron of Canada has travelled from America to Europe, and thence it has been diffused over the eastern continent. Aided also by this, the dandelion, a native of Europe, has diffused itself over every part of our country; neither impeded by the broadest rivers nor intercepted by the loftiest mountains, it has already passed over the Alleghany and become a tenant of the woods of Ohio. The minuteness of some seeds facilitates their dispersion by the wind, and it is found that those which are most minute are most extensively diffused. It is chiefly on this account that mosses and ferns are more widely scattered than those whose seeds are large. Swartz found in Jamaica the same moss which he had been accustomed to gather when climbing the mountains of Europe, and there too the same ferns which he had frequently seen in France, though the other plants were all new and peculiar.

The fruit of many plants being the food of animals, they in various ways scatter the seeds abroad. The squirrel fills his storehouses with a stock of winter's food; but he is either destroyed, or forgets where his treasures were deposited, till they are no longer desirable food. Here his nuts are permitted to germinate, and the very means which threatened to destroy, are made to preserve the trees to which they belong. Birds also lay up a store of food for themselves and their young. While the Hollanders were in possession of the Spice Islands, they endeavored to destroy the nutmegs which they could not defend; and before they relinquished any of their possessions, they carefully rooted out this, their most valuable production. But notwithstanding the vigilance and the jealousy of the Dutch, birds disseminated the seeds of the nutmeg over these very islands, evidently indicating that nature will not acknowledge the improper restrictions which man would make supreme.

But more than birds and animals, more than wind and tide, man contributes to the dispersion of seeds. Of this we shall be convinced, as we learn the history of many well known vegetables, as we trace them from one country to another, and observe in what way they have

been extensively diffused. The wars which led many of the European nations to the Holy Land, brought back many of the esculent vegetables which are seen on our tables, and many of the flowers which adorn our gardens. Commerce has enriched different nations by an interchange of their most valuable productions, and science has discovered in the remotest sections of the earth, vegetables which are now diffused through countries where they were formerly unknown. Buckwheat, and most kinds of grain, were received through Italy from the eastern nations, while the various kinds of cultivated fruit were derived from Greece, ultimately perhaps from the provinces of Asia. Persia is the native country of the peach; Arminia of the apricot; and from these nations they have travelled through Europe, and at last reached this country. The potato was carried from America to Ireland by Sir Walter Raleigh, and from thence it has found its way to almost every section of the eastern continent. These are but a few of the many examples which might be mentioned, to prove how much man has contributed to the dissemination of seeds. The fertility of the vegetable kingdom will warrant the conclusion, that its numerous species have all been preserved in the midst of the dangers which assailed them; dangers, too, which they have no eyes to see, and no voluntary power to avoid.

SENSITIVE PLANT. A remarkable plant that shrinks at the touch. Naturalists have not explained the cause of the collapsing of the sensitive plant. The leaves meet and close in the night, or when exposed to much cold in the day time, in the same manner as when they are affected by external violence; folding their upper surfaces together, and in part over each other, like scales or tiles, so as to expose as little of the upper surface as may be to the air. Another plant that seems to be endowed with a degree of sensation is the sunflower, which follows the course of the sun by nutation, not by twisting its stem.

SERPENTS. In none of the countries of Europe is the serpent tribe sufficiently numerous to be truly terrible. The venomous malignity, also, that has been ascribed to European serpents of old, is now utterly unknown; there are not above three or four kinds that are dangerous, and the poison of all operates in the same manner. Though, however, Europe be happily delivered from these reptiles, in the warm countries that lie within the tropics, as well as in the cold regions of the north, where the inhabitants are few, the serpents propagate in equal proportion. All along the swampy banks of the rivers Niger and Oroonoko, where the sun is hot, the forests thick, and the men but few, the serpents cling among the branches of the trees in infinite numbers, and carry on an unceasing war against all other animals in their vicinity. Travellers have assured us, that they have often seen large snakes twining round the trunk of a tall tree, encompassing it like a wreath, and thus rising and descending at plea-

sure. In these countries, therefore, the serpent is too formidable to become an object of curiosity, for it excites much more violent sensations.

In the East Indies they grow also to an enormous size ; particularly in the island of Java, where we are assured that one of them will destroy and devour a buffalo. In a letter printed in the German Ephemerides, we have an account of a combat between an enormous serpent and a buffalo, by a person who assures us that he was himself a spectator. The serpent had, for some time, been waiting near the brink of a pool, in expectation of its prey, when a buffalo was the first that offered. Having darted upon the affrighted animal, it instantly began to wrap it round with voluminous twistings ; and at every twist the bones of the buffalo were heard to crack almost as loud as the report of a cannon. It was in vain that the poor animal struggled and bellowed ; its enormous enemy entwined it too closely to get free ; till, at length, all its bones being mashed to pieces, like those of a malefactor on the wheel, and the whole body reduced to one uniform mass, the serpent untwined its folds to swallow its prey at leisure. To prepare for this, and in order to make the body slip down the throat more readily, it was seen to lick the whole body over, and thus cover it with its mucus. It then began to swallow it at that end that offered the least resistance ; while its length of body was dilated to receive its prey, and thus took in at once a morsel that was three times its own thickness.

Some serpents bring forth their young alive, as the viper ; some bring forth eggs, which are hatched by the heat of their situation ; as the common black-snake, and the majority of the serpent tribe. When a reader, ignorant of anatomy, is told that some of these animals produce their young alive, and that some produce eggs only, he is apt to suppose a very great difference in their internal conformation, which makes such a variety in their manner of bringing forth. But this is not the case ; these animals are internally alike, in whatever manner they produce their young ; and the variety of their bringing forth is rather a slight than a real discrimination. The only difference is, that the viper hatches her eggs, and brings them to maturity within her body ; the snake is more premature in her productions, and sends her eggs into the light some time before the young ones are capable of leaving the shell. Thus, if either are opened, the eggs will be found in the womb, covered with their membranous shell, and adhering to each other, like large beads on a string. In the egg of both, the young ones will be found, though at different stages of maturity ; those of the viper will crawl and bite the moment the shell that encloses them is broken open ; those of the snake are not yet arrived at their perfect form.

Father Labat took a serpent of the viper kind, that was nine feet long, and ordered it to be opened in his presence. He then saw the

manner in which the eggs of these animals lie in the womb. In this creature there were six eggs, each of the size of a goose egg, but longer, more pointed, and covered with a membranous skin, by which also they were united to each other. Each of these eggs contained from thirteen to fifteen young ones, about six inches long, and as thick as a goose quill. These little mischievous animals were no sooner let loose from the shell, than they crept about, and put themselves into a threatening posture, coiling themselves up, and biting the stick with which he was destroying them. In this manner he killed 74 young ones; those that were contained in one of the eggs, escaped at the place where the female was killed, by the bursting of the egg, and their getting among the bushes.

SHAD. A large species of herring, which inhabits the sea near the mouths of large rivers, and in the spring ascends them for the purpose of depositing its spawn in the shallow water about their sources. The young fry remain for a season in the waters which gave them birth, but on the approach of cold weather descend the rivers, and take refuge in the ocean. The old ones likewise return, and at this time are emaciated and unfit for food. The form of the shad is the same as that of the other herrings, very much compressed, with the abdomen gradually becoming thinner, and forming a serrated edge; and, like them, the bones are much more numerous and more slender than in other fish. The shad which frequents our waters has not been accurately compared with the European, but is probably a different species. It usually weighs four or five pounds, but sometimes twelve; the scales are easily detached, when a row of dark spots is exposed on each side. It is found in all the rivers of our Atlantic coast, is highly esteemed for food, and is consumed in great quantities, in the fresh state, in our principal cities. During the season they are an important source of wealth to the inhabitants of the borders of the Hudson, Delaware, and Chesapeake. Great quantities are salted, but are less esteemed than when eaten fresh.

SHEEP. One of the most extraordinary facts respecting sheep is the vast number of them in ancient as well as in modern times. True, this is the result of the great value of the animal. There are supposed to be twenty millions of sheep in our own country; probably more than this number, as many as there are inhabitants. In Great Britain, the number is set down at between thirty and forty millions. From Scripture accounts, Job had fourteen thousand of this animal. When the Israelites made an incursion into the land of Midian, they brought back with them six hundred and fifty thousand; and when the tribes of Reuben and Gad made war upon the Hagarites, their spoils amounted to two hundred and fifty thousand. The king of Moab was required to make an annual tribute of two hundred thousand sheep; and Solomon, at the dedication of the temple, made an offering of one hundred and twenty thousand of them. From these

and other facts named in the sacred volume, it is inferred that sheep constituted almost the only riches of the people; and they became thus numerous, because few comparatively were slaughtered, their flesh being rarely eaten, except on solemn occasions of sacrifice. It has also been inferred that the ewes then had lambs twice a year. The wealth of the people consisting in sheep, the reason is apparent why the owners of them are so generally represented to have been wandering shepherds.

In those times sheep were valuable for their milk, as well as for their fleeces. This milk was used for human sustenance, so far as we are informed, long before that of the cow. In addition to its use in the liquid form, it was on a large scale converted into butter and cheese. So essential was it as an article of food, that the same systematic usage prevailed for collecting it that now constitutes the order of modern dairies. The only known particular in which there was then made an effort to change the breed of sheep was to change the color of the wool. It is supposed that the fleece of sheep was originally tawny, or dingy black, with rare cases of one being speckled. The fleece, now, as well known, is white; and the origin of this change has been credited to the patriarch Jacob, when he stipulated with Laban for all the ring-streaked sheep and goats, as a compensation for his services. This incident establishes two facts; first, that antecedent to it, the number so marked had been very small, or Laban would not have acceded to Jacob's proposition; and second, that it is in the power of man to produce changes in the breed of animals, of which no one should be ignorant. Here is a truth in animal physiology better understood by Jacob than many modern agriculturists.

SHEPHERD'S DOG. The origin of the sheep-dog is somewhat various; but the predominant breed is that of the intelligent and docile spaniel. It is found in most countries where sheep are kept; and wherever found, possesses much of the same form and character. The muzzle is sharp, the ears are short and erect, and the animal is covered, particularly about the neck, with thick and shaggy hair. The tail is slightly turned up and long, and almost as bushy as that of the fox, even in that variety whose coat is almost smooth. It is of a black color, or black prevails, mixed with gray or brown. Instinct and education combine to fit this dog for our service. He has a natural predisposition for the office he has to discharge, which requires little trouble or skill to develop and perfect.

Mr. Hogg says, and truly, that a single shepherd and his dog, will accomplish more in gathering a flock of sheep from a Highland farm, than twenty shepherds could do without dogs; in fact, that without this docile animal, the pastoral life would be a mere blank. It would require more hands to manage a flock of sheep, gather them from the hills, force them into houses and folds, and drive them to markets, than the profits of the whole flock would be capable of maintaining. Well

may the shepherd feel an interest in his dog ; he indeed it is that earns the family bread, of which he is himself content with the smallest morsel ; always grateful and always ready to exert his utmost abilities in his master's interest. Neither hunger, nor fatigue, nor the worst of treatment, will drive him from his side, and he will follow him through every hardship without murmuring or repining. Buffon says, in his Natural History, that the shepherd's dog, at the head of the flock, makes himself better understood by the sheep than the voice of his master. Safety, order, and discipline, are the fruits of his vigilance, intelligence and activity. His sagacity in exercising control over a flock of sheep, astonishes every one who may witness it.



SHEPHERD'S DOG.

A Mr. Peters, a few years ago, in the Albany Cultivator, says, the sagacity of the shepherd's dog is wonderful, and relates the following anecdote from a Scotch paper he had then recently seen. It seems that the master of a bitch of this breed, purchased at a fair, seventeen miles from his own house, a flock of eighty sheep ; and having occasion to remain a day longer, sent them on under the care of his faithful dog. The poor bitch, when a few miles on the road, dropped two whelps, but faithful to her charge, she drove the sheep on a mile or two further ; then allowing them to stop, she returned for her pups,

which she carried some two miles in advance of the sheep, and thus she continued to do, alternately carrying her own young ones, and taking charge of the flock, till she reached home. The manner of her acting on this occasion was gathered by the shepherd from various persons who observed her on the road. On reaching home and delivering her charge, it was found that the two pups were dead. In this extremity, the instinct of the poor brute was yet more remarkable; for, going immediately to a rabbit's nest, she took two young rabbits, which she deposited on some straw in the barn, where she continued to suckle and watch over them.



SHETLAND BULL.

SHETLAND CATTLE. The Shetland Islands present a wonderful scene of rugged, black, and barren rocks. No tree or shrub relieves these dreary spectacles, and only gray rocks appear rising from the marshes, and pools, and shores, bounded by the wildest precipices. There are few or no artificial grasses, or green crops, or enclosures protecting these crops, and grasses could not be brought to perfection in these islands; there is nothing but moss, heath, and seaweed; yet, there is a breed of cattle of the same origin with the West Highlander, which has been distinguished among stock amateurs. These cattle from the severity of the climate and the scarcity of food are diminutive in size. They are gaunt and ill-shaped, so far as their shape can be ascertained through the long, thick hair with which they are covered, and which forms an impenetrable defence against the snow and the sleet. They are rarely more than four feet high at

the withers, and sometimes scarcely more than thirty-five or forty pounds a quarter.

These Shetland cattle contrive to live on their native moors and wastes, and some of them fatten there; for a considerable and increasing quantity of beef is salted in Shetland and sent to the main land, the quality of which is exceedingly good. When, however, the Shetlanders are transported to the comparatively richer pastures of the north of Scotland, they thrive with incredible rapidity, and their flesh and fat, being so newly and quickly laid on, is said to be peculiarly delicious and tender. But if carried further south they rarely thrive, becoming sickly and poor in the midst of abundance; apparently not able to encounter so great a change of climate.

SHETLAND PONEY. The Shetland poney, called in Scotland sheltie, an inhabitant of the most northern Scottish islands, is a very diminutive animal; sometimes not more than seven and a half hands in height, and rarely exceeding nine and a half. However, if so small in stature, he is by no means contemptible, and is a great favorite with many. He is often exceedingly beautiful, with a moderate sized head, good tempered countenance, a short neck, fine towards the throttle, shoulders low and thick—in so little a creature far from being a blemish; back short, quarters expanded and powerful, legs flat and fine, and pretty round feet. These ponies possess immense strength of their size; will fatten upon the meanest of feed; and are perfectly docile. One of them, nine hands high, is known to have carried a man weighing fourteen stone, or 168 pounds, forty miles in one day.

Mr. Youatt, in the Farmer's Library, mentions, that some little time previous to his making the statement, a friend of his presented him with one of these elegant little creatures. Being several miles from home he was greatly puzzled to know how he should convey his newly acquired property. The Shetlander was scarcely more than seven hands high, and as docile as he was beautiful. "Can we not carry him in your chaise?" said his friend. The curious experiment was tried. The pony was placed in the bottom of the gig, and covered as well as could be with the apron; a few bits of bread kept him quiet; and thus he was safely conveyed away, and exhibited the novel spectacle of a horse riding in a gig.

SHOES. Among the Jews, were made of leather, linen, rush, or wood; those of soldiers were sometimes of brass or iron. They were tied with thongs which passed under the soles of the feet. To put off their shoes was an act of veneration; it was also a sign of mourning and humiliation; to bear one's shoes, or to untie the latches of them, was considered as the meanest service. Among the Greeks, shoes of various kinds were used. Sandals were worn by women of distinction. The Lacedæmonians wore red shoes. The Grecian shoes generally reached to the middle of the leg. The Romans used two kinds of shoes; the calceus, which covered the whole foot some-

what like our shoes, and was tied above with lachets or strings; and the *sala* or slipper, which covered only the sole of the foot, and was fastened with leathern thongs. The *calceus* was always worn along with the toga when a person went abroad; slippers were put on during a journey and at feasts, but it was reckoned effeminate to appear in public with them. Black shoes were worn by the citizens of ordinary rank, and white ones by the women. Red shoes were sometimes worn by the ladies, and purple ones by the coxcombs of the other sex. Red shoes were put on by the chief magistrates of Rome on days of ceremony and triumph. The shoes of senators, patricians, and their children, had a crescent upon them, which served for a buckle; these were called *calcei lunati*.

In the ninth and tenth centuries the greatest princes of Europe wore wooden shoes, or the upper part of leather and the sole of wood. In the reign of William Rufus, a great beau, Robert, surnamed the Horned, used shoes with long sharp points, stuffed with tow, and twisted like a ram's horn. It is said the clergy, being highly offended, declaimed against the long pointed shoes with great vehemence. The points, however, continued to increase, till in the reign of Richard II. they were of so enormous a length that they were tied to the knees with chains sometimes of gold, sometimes of silver. The upper parts of these shoes in Chaucer's time were cut in imitation of a church window. The long pointed shoes were called *crackowes*, and continued in fashion for three centuries, in spite of the bulls of popes, the decrees of councils, and the declamations of the clergy. At length the parliament of England interposed by an act, A. D. 1463, prohibiting the use of shoes or boots with pikes exceeding two inches in length, and prohibiting all shoemakers from making shoes or boots with longer pikes under severe penalties. But even this was not sufficient; it was necessary to denounce the dreadful sentence of excommunication against all who wore shoes or boots with points longer than two inches. The present fashion of shoes was introduced in 1633; the buckle was not used till 1670.

In Norway they use shoes of a particular construction, consisting of two pieces, and without heels; in which the upper leather fits close to the foot, the sole being joined to it by many plaits or folds. The shoes or slippers of the Japanese, as we are informed by Professor Thunberg, are made of rice straw woven, but sometimes, for people of distinction, of fine slips of ratan. The shoe consists of a sole without upper leather or hind piece; forwards it is crossed by a strap of the thickness of one's finger, which is lined with linen; from the tip of the shoe to the strap a cylindrical string is carried, which passes between the great and second toe, and keeps the shoe fast on the foot. As these shoes have no hind piece, they make a noise when people walk in them like slippers. When the Japanese travel, their shoes

are furnished with three strings made of twisted straw, with which they are tied to the legs and feet, to prevent them from falling off.

Some people carry one or more pairs of shoes with them on their journeys, in order to put on new, when the old ones are worn out. When it rains, or the roads are very dirty, these shoes are soon wetted through, and one continually sees a great number of worn-out shoes lying on the roads, especially near the brooks, where travellers have changed their shoes after washing their feet. Instead of these, in rainy or dirty weather, they wear high wooden clogs, which underneath are hollowed out in the middle, and at top have a band across like a stirrup, and a string for the great toe; so that they can walk without soiling their feet. Some of them have their straw shoes fastened to these wooden clogs. The Japanese never enter their houses with their shoes on; but leave them in the entry, or place them on the bench near the door, and thus are always barefooted in their houses, so as not to dirty their neat mats. During the time that the Dutch live at Japan, when they are sometimes under an obligation of paying visits at the houses of the Japanese, their own rooms at the factory being likewise covered with mats of this kind, they wear, instead of the usual shoes, red, green, or black slippers, which on entering the house they pull off; however, they have stockings on, and shoes made of cotton stuff with buckles in them, which shoes are made at Japan, and can be washed when dirty. Some have them of black satin, to avoid washing them.

SHOOTING STARS, or METEORS. The luminous appearances, known by the name of shooting stars, are too common not to have been seen by most of the persons for whom this book is designed. But as frequent as they are, the phenomenon is not well understood. Some imagine that they are occasioned by electricity, and others that they are nothing but luminous gas, perhaps phosphureted hydrogen. Others have again supposed, that some of them are luminous bodies which accompany our planet in its revolution about the sun, and that their return to certain places might be calculated with as much certainty and exactness as that of any of the comets.

Signior Baccaria supposed they are occasioned by electricity. His opinion is confirmed by the following observations. About an hour after sunset, he and some friends that were with him, observed a falling star, directing its course directly towards them, and apparently growing larger and larger, but just before it reached them it disappeared. On vanishing, their faces, hands, and clothes, with the earth and all the neighboring objects, became suddenly illuminated with a diffused and lambent light. It was attended with no noise. During their surprise at this appearance, a servant informed them that he had seen a light shine suddenly in the garden, and especially upon the streams which he was throwing to water it.

On the 12th of November, 1799, there was seen a very remark-

able exhibition of shooting stars, at Cumana, in South America, and over most of the West India Islands. The following account of it is from the pen of a gentleman who witnessed it. He says : " I was called up about three o'clock in the morning, to see the shooting of stars, as it is called. The phenomenon was grand and awful. The whole heavens appeared as if illuminated with sky rockets, which disappeared only by the light of the sun after daybreak. These meteors appeared as numerous as the stars, flying in all possible directions, except from the earth, towards which they all inclined more or less, and some of them descended perpendicularly over the vessel we were in, so that I was in constant expectation of their falling on us.

About thirty years previous to this time, a similar phenomenon was observed on the table-land of the Andes. At Quito, there was seen in one part of the sky, above the volcano of Gayamba, so great a number of falling stars, that the mountain was thought to be in flames. This extraordinary light lasted more than an hour. Those meteors which are heard to burst, the explosion being followed, as is sometimes the case, by the fall of stones, are called aerolites. These stones often descend with such force as to bury themselves several feet in the earth. Many attempts have been made to account for the formation and ignition of these grand objects ; but the subject still remains enveloped in mystery.

It has been said that the stones, thus incontestibly proved by different authorities, and from various places, to have fallen after the explosion of meteors, are heated and luminous when they reach the earth, and they have been seen in Europe, Asia, and America. The stones are of different sizes, and from a few ounces in weight to several tons. They are generally of a circular form, and covered with a rough black crust. Meteoric stones have been subjected to chemical analysis, and are found to be entirely different from all known stones belonging to the earth. The most remarkable of these meteors, so recently seen, were those of 1783 and 1805. The former was very luminous, and its diameter was estimated to be a thousand yards. The latter passed with such astonishing rapidity, that amazement had not subsided ere it vanished ; consequently, but very little dependence can be placed on what has been said concerning its bulk and shape. The light which it emitted was a pale blue, and almost as instantaneous as a flash of lightning, and the rushing of the enormous body produced a sound like very distant thunder.

SHORT-HORNED CATTLE. The Durham cattle are usually called short horns. From the earliest periods to which we have any accounts of our breeds of cattle, says Mr. Martin, the counties of Durham and York have been celebrated for these cattle, particularly as extraordinary milkers. The Durham short horns are of all colors, from a pure creamy white to a deep red ; but generally these colors are intermixed in patches of every imaginable shape and of all sizes,

blended into a beautiful roan. Their form is well spread, symmetrical, and imposing, and capable of sustaining a large weight of valuable carcass. The horn was originally branching and turned upward, but now frequently has a downward tendency, with the tips pointing towards each other. They are light, and comparatively short; clear, high polished, and waxy. The head is finely formed, with a longer face, but not as fine a muzzle, as the Devon. Mr. Stephens remarks, that a dark red color usually indicates hardness of constitution, richness of milk, and disposition to fatten; and that high red indicates a large quantity of thin milk, and little disposition to fatten.

The weights reached by the short horns in England, says Mr. Allen, author of *Domestic Animals*, have been enormous. Two oxen, six years old, weighed nett, 1,820 pounds each. A heifer of three years old, and fed on grass and hay alone, weighed 1,260 pounds. A four-year-old steer, fed on hay and turnips only, dressed 1,890 pounds. A cow reached the prodigious weight of 1,778 pounds. A heifer running with her dam, and on pasture alone, weighed, at seven months, 476 pounds. An ox, seven years old, weighed 236 pounds. From the comparatively small numbers in this country, most of these cattle are kept as breeders; few, as yet, have been fattened, and such only as were decidedly inferior. Such animals as have been extensively produced by crossing this breed upon our former stocks, have given evidence of great and decided improvement; and the short horns and their grade descendants are destined, at no distant day, to occupy a large portion of the richest feeding-grounds in the United States.

In England, where so much effort has been made to improve these cattle, there has been a disposition to pay high prices, bordering on wildness or insanity. In 1810, Mr. Charles Collings sold his bull *Favorite* for one thousand guineas; another one for three hundred and sixty-five guineas; his cow *Cupid* for four hundred guineas; and his cow *Cornet* for four hundred and ten guineas. And the produce of his whole stock, of forty-seven head, including calves and heifers, amounted to £7,115 17s. He also raised an ox for which one time, two thousand pounds were offered and refused. The live weight of this ox at one time was 3,780 pounds. In our own country, such prices have not been known. However, prior to the year 1840, there was, with a few of our enterprising citizens, a manifestation of a speculative temperament, that led, in some instances, to prices varying from five hundred to a thousand dollars for favorite animals. The following years of commercial embarrassment reduced their market price below their intrinsic value. The current of feeling is again turning in their favor; and the presumption now is that the rearing of the best breeds of cattle will become an object of permanent interest. There will be again no occasion for prices so high as to bring the business into disgrace. It will be a legitimate and patriotic de-

partment of rural economy, justifying honorable competition, and leading to well defined and satisfactory remuneration for all judicious investment.



LORD ALTHORP'S SHORT-HORNED BULL.

SILKWORM. The silkworm is as beneficial as the scorpion is noxious, and produces an article of ornament and commerce universally known and admired. This insect is of the caterpillar genus, of a whitish color, with twelve feet, and at last produces a butterfly of the moth kind. It is a native of China and the easternmost parts of Asia, and has been gradually introduced into various parts of the world. Silk was anciently brought in small quantities to Rome; but it was so scarce as to be sold there for its weight in gold.

There is given, in the "Letters on Ancient and Modern History," a succinct account of the silk trade carried on between ancient Rome and the oriental countries of Asia, and of the introduction of the silkworm into the Roman empire; which it is therefore unnecessary here to repeat. Since that event, which forms an important era in the history of commerce, this valuable insect has been diffused throughout all the warm countries of Asia and Europe. In China, Tonquin, and other hot countries, they are left at liberty on the trees

where they are hatched ; but to breed them in Europe, and America, they must be sheltered from the inclemency of the weather, and carefully protected from every external injury. For this purpose, a room is chosen with a southern aspect, the windows of which are so well glazed as not to admit of the least air when it is cold. The walls are well built, and the planks of the floor laid close, so as not to admit the entrance of birds, mice, or even insects. In the middle of the room four pillars or posts are erected, and placed so as to form a pretty large square. Between these are diverse stories constructed with osier hurdles ; and under each hurdle is a floor surrounded with an upright border. These all hang upon pillars, in such a manner as to be placed or taken down at pleasure.

This is the mode of constructing a habitation for the silkworms generally used by the most skillful breeders of these valuable insects in European countries. Their food consists of mulberry leaves, of which they must have a fresh supply every morning, and the remainder of the old leaves must also be carefully taken away, and every thing must be kept very clean ; for nothing is so hurtful to them as uncleanness and moisture. For this reason the leaves must be gathered when dry, and kept in a dry place, if it be necessary to lay in a store. If mulberry leaves cannot be obtained, the leaves of lettuce or hollyhock will sustain the worms ; but they will not thrive so well upon this diet ; their silk will neither be so abundant nor of so good a quality. Although the judicious choice and careful management of their diet, with a strict attention to cleanliness, be absolutely necessary, there is yet another precaution of equal importance,—which is, to give them air, by opening the windows at such times as the sun shines with the greatest heat and clearness.

The silkworm is an insect not more remarkable for the precious matter it furnishes for divers stuffs, than for the many forms it assumes, before and after its being enveloped in the rich cod or ball which it weaves for itself. From a small egg, about the size of a pin's head, which is its first state, it becomes a pretty big worm, or caterpillar, of a whitish color, inclining to yellow. In this state it feeds on mulberry leaves, till, being come to maturity, it winds itself up in a silken bag, or case, about the size and shape of a pigeon's egg ; and becomes metamorphosed into an *aurelia* ; in this state it remains without any signs of life, or motion ; till at length it awakes to become a butterfly, after making itself a passage out of its silken sepulchre ; and, at last, dying indeed, it prepares itself, by an egg which it casts, for a new life ; which the warmth of the summer weather assists it in resuming.

As soon as the silkworm, or caterpillar, is arrived at the size and strength necessary for beginning his cod, he makes his web ; for it is thus they call that slight tissue, which is the beginning and ground of this admirable work. This is his first day's employment. On the

second, he forms his ball, and covers himself almost over with silk. The third day, he is quite hid ; and the following days he employs himself in thickening and strengthening his ball ; always working from one single end, which he never breaks by his own fault ; and which is so fine, and so long, that those who have examined it attentively, think they speak within compass, when they affirm that each ball contains silk enough to reach the length of six English miles.

SKATING. An exercise on ice, both graceful and healthy. Although the ancients were remarkable for their dexterity in most of the athletic sports, yet skating seems to have been unknown to them. It may therefore be considered as a modern invention ; and probably derived its origin in Holland, where it was practised, not only as a graceful and elegant amusement, but as an expeditious mode of travelling when the lakes and canals were frozen up during winter. In Holland long journeys are made with ease and expedition ; but in general less attention is there paid to graceful and elegant movements, than to the expedition and celerity of what is called journey skating.

It is only in those countries where it is considered as an amusement that its graceful attitudes and movements can be studied ; and there is no exercise whatever better calculated to set off the human figure to advantage. The acquirement of most exercises may be attained at an advanced period of life ; but to become an expert skater, it is necessary to begin the practice of the art at a very early age. It is difficult to reduce the art of skating to a system. It is principally by the imitation of a good skater that a young practitioner can form his own practice. Those who wish to be proficient should begin at an early period of life, and should first endeavor to throw off the fear which always attends the commencement of an apparently hazardous amusement. They will soon acquire a facility of moving on the inside ; when they have done this, they must endeavor to acquire the movements on the outside of the skates, which is nothing more than throwing themselves up on the outer edge of the skate, and making the balance of their body tend towards that side, which will necessarily enable them to form a semicircle.

SKIN. The skin is the external covering of the animal body. The impressions made on it, by the contact of foreign substances, are transmitted to the brain, by means of the nerves coming from this latter, and give rise in the mind to the sensations of roughness or smoothness, hardness or softness, heat or cold, according to the property of the substance applied. In other words, the skin is the seat of the sense of touch—and like all the other senses, is capable, when strongly impressed, of acting powerfully on the brain, and producing great mental disturbance, accompanied in some cases with convulsions ; and, in others, going on to insanity. During the wars of religion in France, between the Catholics and Huguenots or Protestants,

many of the latter, belonging to the province of Cevennes, were subjected to the martyrdom of being tickled to death, or the necessity of abjuring their creed. In certain diseases of the skin, the itching is so intolerable, as to drive the sufferers into actual madness.

Sensations of a very different and pleasurable character are experienced, when polished bodies or soft and elastic ones of a mild temperature, are applied to the skin. These effects are produced, by rubbing slowly in the same direction with the hand of another person. The influence of this operation is not confined to the skin, but is diffused throughout the whole animal economy ; as is evinced in general languor ; disinclination to motion, and indolence of thought ; a mild and diffused warmth of the skin itself ; languid circulation of the blood, and subsidence or removal of former pain. Such are often the effects of the touching and frictions of the magnetisers, to which they are mainly indebted for the favorable belief in their powers, and by which they sometimes obtain undoubted success in irritations and spasms of persons possessed of great delicacy and sensibility of frame.

The tepid and warm baths produce nearly analogous effects. It is more especially in southern climates, the inhabitants of which have such exquisite sensibility, that the highest enjoyments of the sense of touch are experienced. All travellers in Turkey, Persia, and Egypt, unite in praising the luxury and ornaments of the bathing establishments in those countries ; and all concur in describing the luxurious languor, the pleasurable sensations pervading the whole nervous system, when the bather after coming out of the bath, reclines on a couch, and has the entire surface of the body gently rubbed, by attendants in waiting for the purpose. The women in particular are lulled to a soft repose, of hours' duration, by this means.

SKINS. In Commerce, the membranous coverings of animals, which are converted to several uses. When employed with the hair remaining on them, they are distinguished by the names of peltry and fur ; when dressed for writing, painting, and other purposes, by those of parchment and vellum ; and when tanned, by the general name of leather, or the particular name of the leather manufactured, or of the animal from which it was obtained ; as morocco and calf skin.

SKY. The blue expanse, otherwise called heaven, and the firmament. With respect to its color, Leonardo da Vinci, and M. de la Hire, have explained it as resulting from the mixture of white and black, which is produced when we see the dark regions of the atmosphere through the light of the sun ; but Sir Isaac Newton attributes it to the vapors, which, beginning to condense, have had time sufficient to reflect the most reflexible rays, that is, the violet ones, but not enough to reflect the rest. One thing is certain, that, whatever be the cause of the blue color of that space in which the stars move, and which bounds all the visual prospects of this globe, the color that we see by night, and that which we see by day, are the same ; and

that the apparent difference consists in this, that, in the latter case, the light is between it and our eyes ; and, in the former, the light is at our backs.

SLEEP. That state wherein the body seems perfectly at rest, and external objects act on the organs of sense, without exciting their usual sensations. Sleep is necessary not only to animals, but even some of the vegetable tribes have the faculty of assuming, during the night, a position essentially different from that which they bear throughout the day. This change takes place principally towards the approach of night, in leaves and flowers ; the appearance of which often varies so considerably, that the same plants can scarcely be recognized. During the night, their leaves are observed to rise or curl up, and sometimes to be pendent, according to the nature and genus of the plant, in order to protect the flowers, buds, and young stems. This period of rest is absolutely necessary to vegetables ; their irritability being exhausted by the light and warmth of the day.

SLEEPING APARTMENTS. Every one, who is actuated by a due regard for his health and real comfort, will consider an equal degree of attention necessary in regard to the size, situation, temperature and cleanliness of the room he occupies during the hours of repose, as of his parlor, drawing-room, or any other apartment ; and yet, how often do we find families crowded at night into obscure and confined chambers, of dimensions scarcely more ample than those of an old fashioned closet, while perhaps, in most instances, the best rooms in the house will be set aside for the sole purpose of ostentatious display. It is all-important that the largest and most lofty room, upon the second floor, be appropriated for the sleeping apartment, and that it be freely ventilated, during the day time, at all seasons, when the weather is not rainy, or otherwise very humid. There are few houses, the rooms of which are so situated as to render the latter impracticable ; and the influence of the practice upon the health of the inmates is too important to permit its being neglected from any slight cause.

While too great a degree of caution cannot be observed to avoid sleeping in damp rooms, beds, or clothing, the temperature of the bed-chamber should, if possible, never be augmented, under the ordinary circumstances of health, by artificial means. As this apartment is to be reserved solely for repose, a fire is never necessary, excepting, perhaps, during uncommonly severe weather ; and even then the temperature ought not to exceed fifty degrees. A sleeping apartment, in which a large fire has been kept up for several hours previous to the period of retiring to rest, may to many, at the first view, present an appearance of the most perfect comfort—it is, however, at the same time, a means of very effectually enervating the system—creating an increased susceptibility to the influence of cold, and thus opening the

way to the attack of some of the most serious diseases, especially of the chest. Happy may they esteem themselves whose means forbid an indulgence in this species of luxury.

A person accustomed to undress in a room without fire, and to seek repose in a cold bed, will not experience the least inconvenience, even in the severest weather. The natural heat of his body will very speedily render him even more comfortably warm, than the individual who sleeps in a heated apartment, and in a bed thus artificially warmed, and who will be extremely liable to a sensation of chilliness as soon as the artificial heat is dissipated. But this is not all—the constitution of the former, will be rendered more robust, and far less susceptible to the influence of atmospherical vicissitudes, than that of the latter.

All must be aware, that in the coldest weather, a fire in the bed-chamber can only be necessary during the periods occupied in dressing and undressing. When the individual is in bed, it is not only altogether useless, but to a certain extent injurious. It might be supposed, however, that bad effects would result from rising out of a warm bed, of a morning, in a cold chamber. We are assured, however, that if the business of dressing be performed with rapidity, and brisk exercise be taken previously to entering a warm apartment, they who would pursue this plan would render themselves less dependent for comfort upon external warmth—a circumstance of very great importance as a means of guarding against colds, coughs and consumptions.

SMELL. To the use of discerning prejudicial food, the sense of smelling is subservient; by which we both perceive their noxious nature, before they be tasted, which might be dangerous; and especially avoid putridity in our victuals, which to us is exceedingly hurtful; and discover what is grateful and wholesome; although, by habit, this advantage of smell is more conspicuous in animals than in man. But men who have been left to themselves, and whose sense of smell has not been corrupted by variety, have been observed most certainly to retain that sagacious faculty in distinguishing food in an eminent degree. The powers of medicinal plants are hardly to be estimated better than by the simple testimonies of taste and smell. Hence in all animals the organ of smell is placed near the mouth; and hence the smell is stronger, and the organs larger, in those animals which have to seek their prey at a considerable distance, or to reject deleterious plants from among their food.

The actions of smell is strong, but of short continuance; because particles in a very minute state are applied to naked nerves, in the immediate vicinity of the brain. Hence the deleterious and refreshing actions of odors, by which people are resuscitated from faintings, and even from drowning. Hence the violent sneezing, excited by acrid particles, the evacuation of the bowels by the smell of purgatives, and

in some few cases, perhaps, though by no means always, the power of antipathies. Hence the pernicious effects of excessive sneezing, more especially blindness, from the great sympathy of the nerves.

SNOW. A well known substance, formed by the freezing of the vapors in the atmosphere. It differs from hail and hoar frost, in being, as it were, crystalized, which they are not. This appears on examining a flake of snow by a magnifying glass; when the whole of it will appear to be composed of fine shining spicula, diverging like rays from a centre. As the flakes fall down through the atmosphere, they are continually joined by more of these radiated spicula, and thus increase in bulk like the drops of rain or hailstones. Dr. Grew, in a discourse on the nature of snow, observes, that many parts thereof are of a regular figure, for the most part stars of six points, and are as perfect and transparent ice as any we see on a pond. Upon each of these points are other collateral points, set at the same angles as the main points themselves; among which there are divers other irregular, which are chiefly broken points, and fragments of the regular ones.

Others, also, by various winds, seemed to have been thawed, and frozen again into irregular clusters; so that it seems as if the whole body of snow were an infinite mass of icicles irregularly figured; that is, a cloud of vapors being gathered into drops, the said drops forthwith descend; upon which descent, meeting with a freezing air as they pass through a colder region, each drop is immediately frozen into an icicle, shooting itself forth into several points; but these still continuing their descent, and meeting with some intermitting gales of warmer air, or in their continual waftage to and fro touching upon each other, some of them are a little thawed, blunted, and again frozen into clusters, or entangled so as to fall down in what we call flakes. The lightness of snow, although it is firm ice, is owing to the excess of its surface in comparison to the matter contained under it; as gold itself may be extended in surface till it will ride upon the least breath of air. The whiteness of snow is owing to the small particles into which it is divided; for ice, when pounded, will become equally white.

According to Beccaria, clouds of snow differ in nothing from clouds of rain, but in the circumstance of cold that freezes them. Both the regular diffusion of the snow, and the regularity of the structure of its parts, show that clouds of snow are acted upon by some uniform cause like electricity; and he endeavors to show how electricity is capable of forming these figures. He was confirmed in his conjectures by observing, that his apparatus for observing the electricity of the atmosphere never failed to be electrified by snow as well as rain. Professor Winthrop sometimes found his apparatus electrified by snow when driven about by the wind, though it had not been affected by it when the snow itself was falling. A more intense

electricity, according to Beccaria, unites the particles of hail more closely than the more moderate electricity does those of snow, in the same manner as we see, that the drops of rain which fall from thunder clouds are larger than those which fall from others, though the former descend through a less space.

Were we to judge from appearances only, we might imagine that so far from being useful to the earth, the cold humidity of snow would be detrimental to vegetation. But the experience of all ages asserts the contrary. Snow, particularly in those northern regions where the ground is covered with it for several months, fructifies the earth, by guarding the corn or other vegetables from the intenser cold of the air, and especially from the cold piercing winds. It has been a vulgar opinion, very generally received, that snow fertilizes the land on which it falls more than rain, in consequence of the nitrous salts, which it is supposed to acquire by freezing.

But it appears from the experiments of Margraaf, in the year 1731, that the chemical difference between rain and snow water is exceedingly small; that the latter is somewhat less nitrous, and contains a somewhat less proportion of earth than the former; but neither of them contain either earth, or any kind of salt, in any quantity which can be sensibly efficacious in promoting vegetation. Allowing, therefore, that nitre is a fertilizer of land, which many are upon good grounds disposed utterly to deny, yet so very small is the quantity of it contained in snow, that it cannot be supposed to promote the vegetation of plants upon which the snow has fallen. The peculiar agency of snow, as a fertilizer, in preference to rain, may admit of a very rational explanation, without recurring to nitrous salts, supposed to be contained in it. It may be ascribed to its furnishing a covering to the roots of vegetables, by which they are guarded from the influence of the atmospherical cold, and the internal heat of the earth is prevented from escaping.

The internal parts of the earth are heated uniformly to the forty-eighth degree of Fahrenheit's thermometer. This degree of heat is greater than that in which the watery juices of vegetables freeze, and it is propagated from the inward parts of the earth to the surface, on which the vegetables grow. The atmosphere being variably heated by the action of the sun in different climates, and in the same climate at different seasons, communicates to the surface of the earth, and to some distance below it, the degree of heat or cold which prevails in itself. Different vegetables are able to preserve life under different degrees of cold, but all of them perish when the cold which reaches their roots is extreme. Providence has, therefore, in the coldest climates, provided a covering of snow for the roots of vegetables, by which they are protected from the influence of the atmospherical cold. The snow keeps in the internal heat of the earth which surrounds the roots of vegetables, and defends them from the cold of the atmosphere.

SOAP. Pure white soap ought to be invariably used in ablutions of the face and hands, or of the surface generally. But it may be asked, what necessity is there for the use of any kind of soap in washing? We reply, that personal cleanliness cannot be effectually secured without it. A few remarks will render this evident to every one. In addition to the perspiration which is thrown out by the skin, a portion of which always remains upon this surface, it is constantly lubricated by an oily fluid. It is this that occasions, after bathing, the water, with which it does not unite, to collect in minute drops upon the body, and which gives to the skin of those in whom it is furnished in large quantities, an habitual greasy and dirty appearance; while of those in whom it is deficient, the skin has a harsh, dry, and scaly aspect. This oily exudation greases the linen where it is worn for too long a time—catches the dust floating in the air, and causes it to adhere to the skin, and likewise retains in contact with our bodies, a portion of the excrementitious matter, which it is the office of the skin to discharge from the system. The removal of this deposit, which is constantly accumulating, is absolutely necessary, as well for personal comfort as for the preservation of health. Now the oily matter referred to, with the foreign substances accidentally combined with it, is not readily or completely soluble in simple water; it cannot, therefore, be effectually removed without the occasional use of soap, with which it combines without difficulty.

The frequency with which it is necessary to wash with soap will depend, in a great measure, upon the occupation and exposure of individuals. If these be such as do not subject them to an atmosphere loaded with dust, or to the frequent contact of such substances as have a tendency to soil the skin, washing the face, hands, and arms, once a day, with soap and water, will be sufficient, particularly if the water be warm or tepid, and its application be followed by brisk friction with a somewhat coarse towel. But mechanics, and they who, from any cause, are peculiarly liable to have deposited upon their skin, dust, dirt, or any foreign matters, will find that washing several times a day, especially before each meal, and previously to retiring to bed, in addition to a frequent use of the bath, will be demanded, as well for the preservation of the skin as of their health generally. Upon the laboring classes the importance of frequent ablutions cannot be too strongly urged—cleanliness of the person in its strictest sense, is too often practiced by them in a very imperfect manner. Repeated washing of the face, hands, arms, and feet, though all important, is not sufficient. The entire surface of the body requires equal attention; and it would be well if measures were adopted to afford to every laborer and mechanic the time and means for the daily use of the bath in summer, and its not unfrequent use in winter.

SOIL. Soil is the general name applied to the surface of all sorts of land. It consists of the fine powdery material formed by the

chemical and mechanical action of the air, water, and different degrees of temperature, from the primitive rocks of the earth, incorporated with each other in an endless variety of proportions, and mixed with decayed and other vegetable matter in every stage of decomposition. The soil thus formed affords a place for vegetable life, by enabling the seed and plant there to fix itself mechanically to one spot, and by its peculiar properties of affording moisture and the other ingredients necessary for the development of plants in all their stages, to arrive at maturity, and thus furnish a supply of food to man and animals.

The various ingredients necessary for vegetable life, all exist in the primitive rocks of earth, and by their destruction these ingredients are rendered available for plants, and as farther, this integration is constantly going on, it must as a matter of necessity occur, that a greater power daily exists for the support of the vegetable creation. The substances produced by the decomposition of the various strata of the original rock, are potash, soda, phosphoric acid, magnesia, lime, and silex. That such disintegration is constantly going on, is evident from many causes; and one is, that the lavas in Sicily, which have been thrown out from Mount Etna within a comparatively recent period, are now found covered with a fertile soil, which could only have arisen from this source; and which is proved to be derived from this cause by the chemical analysis of the rock itself, which yields the substances found under other modifications in the soil itself.

This fertility is owing to the alkalies which are contained in the lava, and which, by exposure to the combined action of the air and moisture, are reduced to a state capable of being absorbed by plants. A soil which has been subjected to this influence for ages, and from which no crops have been removed, will be enabled to support a luxuriant vegetation for many seasons successively, without any supply of manure, simply because the soil is full of the alkaline matter, phosphates, and other ingredients necessary for the growth of plants; but when under cultivation, and when the crops are removed from it, it must become gradually exhausted, and unless the alkaline property removed with the crop is restored in the shape of manure to the land, the soil will become eventually quite unable to support a crop and bring it to perfection. To ascertain annually how much of the fertilizing agents of the soil are removed from it in the removal of the crops, and then to restore to it in the form of manure what is equivalent to them, is the province of scientific agriculture.

SOILING. Cutting green food daily during the summer, and giving it to cattle in yards or stables, is called soiling; and in some countries is the common method of feeding stock. In our own country, owing probably to the cheapness of land and the dearness of labor, this is as yet but little practiced. The advantages of soiling are, that one acre cultivated for this purpose will afford as much susten-

ance as three acres will, when lying in pasture. When land is used for pastures, more grass is trodden under foot, or otherwise rendered unfit for food, than is eaten. Josiah Quincy, of Massachusetts, from actual experiment, came to this conclusion. Many experiments have been made in England establishing the same conclusion. Cattle also thrive far better when soiled, than when allowed to collect their own food. If their feed is collected for them, and given to them fresh, they eat it when in its most nutritious condition; fill themselves in a very short time, and then lie down and become fattened from it; whereas, if they collect it themselves in pastures, unless the grass is of luxuriant growth, it takes them the whole time to fill themselves; they have no time for rest; and their constantly roaming about, like labor to the ox or horse, only in a less degree, prevents their acquiring fat or muscle.

The labor indeed of cultivating the land to be used in producing summer food for cattle, and of cutting it whenever wanted, forms an important item of expense. There is nevertheless a material saving of labor or money or its equivalent. In the six months of cattle running at large in pasture there is a loss of five dollars in manure, at least, for each grown animal, which in soiling is saved. This for ten head of cattle would be a saving of fifty dollars a year. On a farm of seventy-five acres fenced into lots of the usual size, it will cost on an average fifty dollars a year to keep the fences in repair. Half of this may be saved if cattle are soiled and not allowed to run at large. Then, if ten acres will support as many cattle by soiling as thirty will by pasturage, the interest of money on the cost of twenty acres will also be saved. If the land is worth only twenty dollars per acre, a very low price, this will be the interest of four hundred dollars, or about twenty-five dollars, annually. Now, it is easy from these hints to form an opinion which of the two modes of feeding cattle in summer is most economical.

SOOT. This is a complicated and variably mixed substance, usually produced by the combustion of wood and of mineral coal. Its composition, and consequently its effects, as a fertilizer, must vary with the nature and quality of the fuel, and the manner in which it is burned, as well as the height and structure of the chimney or apparatus in which it is collected. As the soot of wood fire is somewhat limited, and as that produced from mineral coal is more abundant, attention should be more particularly directed to the latter. As this coal is now generally used in cities, with becoming care in sweeping chimnies soot might there be saved and sold to farmers for a handsome sum annually. If each family would save a bushel only, and double that quantity might be saved, the produce of the earth in the neighborhood of cities would be augmented to an incredible amount.

The composition of soot from mineral coal will of course vary with

the kind of coal used for fuel, and with the circumstances under which it is burned. From whatever variety it is derived, it will contain a number of organic as well as inorganic bodies, including a considerable portion of coal ashes, which have been carried up and lodged in the chimney by the draught. One of its most prominent ingredients is the large amount of ammonia it contains. Besides this, it yields the phosphates, the sulphates, carbonates, and chlorides of lime, potash, soda, iron, and magnesia, which are the principal inorganic ingredients, and show that soot is quite a powerful manure. A few years ago it was stated in an English paper, that soot had been successfully used for potatoes, producing a great yield and preventing the rot.

SOLIDITY. In Physics, a property of matter or body, whereby it excludes every other body from that place which itself possesses. Solidity in this sense, is a property common to all bodies, whether solid or fluid. It is usually called impenetrability; but solidity expresses it best, as carrying somewhat more of positive with it than the other, which is a negative idea. The idea of solidity, Mr. Locke observes, arises from the resistance we find one body make to the entrance of another into its own place. Solidity, he adds, seems the most extensive property of body, as being that whereby we conceive it to fill space; it is distinguished from mere space, by this latter not being capable of resistance or motion. It is distinguished from hardness, which is only a firm cohesion of the solid parts, so as they may not easily change their situation. The difficulty of changing situation gives no more solidity to the hardest body than to the softest; nor is a diamond properly a jot more solid than water. By this we distinguish the idea of the extension of the body, from that of the extension of space; that of body is the continuity or cohesion of solid, separable, movable parts; that of space the continuity of unsolid, inseparable, immovable parts.

SONG OF BIRDS. The song of birds has been defined to be a succession of three or four different notes, which are continued without interruption through the same intervals, in a bar of four crotchets, adagio, or whilst a pendulum swings four seconds. It is observed, that notes in birds are no more innate than language in man, and that they depend entirely on the master under which they are bred, as far as their organs will enable them to imitate the sounds which they have frequent opportunities of hearing; and their adhering so steadily, even in a wild state, to the same song, is entirely owing to the nestling attending only to the instruction of the parent-bird, whilst they disregard the notes of all others that may, perhaps, be singing round them.

Birds in a wild state do not commonly sing more than six or seven months out of the twelve; but birds that are caged and have plenty of food sing the greater part of the year; and we may add, that the female of no species of bird sings. It has been remarked, that there

is no instance of any bird singing whose size exceeds that of our black-bird ; and this is supposed to arise from the difficulty it would have of concealing itself, did it call the attention of its enemies, not only by its bulk, but by the proportionable loudness of its notes.

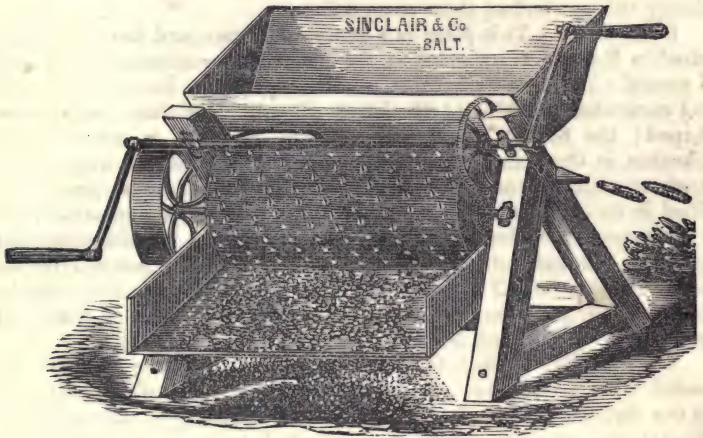
It has been noticed by some writers, that certain passages of the song in a few kinds of birds correspond with the intervals of our scale, of which, indeed, the cuckoo affords a striking and well known instance ; but much the greater part of such song is not capable of musical notation ; partly because the rapidity is often so great, and it is also so uncertain when they may stop, that we cannot reduce the passages to the form of any musical bar whatsoever ; partly also, because the pitch of most birds is considerably higher than that of the shrillest notes of our highest instruments ; and principally because the intervals used by birds are commonly so minute and consequently so different from the more gross intervals into which we divide our octave, that we cannot judge of them.

Most people, who have not attended to the notes of birds, suppose that all those of the same species sing exactly the same notes and passages, which is by no means true, though it must be admitted that there is a general resemblance. The nightingale has been almost universally esteemed the most capital of singing birds ; and its superiority chiefly consists in the following particulars ; its tone is much more mellow than that of any other bird, though by the exertions of its powers it can be extremely brilliant. Another point of superiority is its continuance of song without a pause, which is often extended to twenty seconds.

SPECTRUM. In Optics, when a ray of light is admitted through a small hole, and received on a white surface, it forms a luminous spot. If a dense transparent body be interposed, the light will be refracted in proportion to the density of the medium ; but if a triangular glass prism be interposed, the light is not merely refracted, but divided into seven different rays. The ray of light no longer forms a luminous spot, but has assumed an oblong shape, terminating in semi-circular arches, and exhibiting seven different colors. This image is called the spectrum, and, from being produced by the prism, the prismatic spectrum. These different colored rays appearing in different places of the spectrum, show that their refractive power is different. Those which are nearest the middle are the least refracted, and those which are the most distant, the greatest.

The order of the seven rays of the spectrum is the following ; red, orange, yellow, green, blue, indigo, violet. The red, which is at one end of the spectrum, is the least, and the violet, which is at the other end, is the most refracted. Sir Isaac Newton found, if the whole spectrum was divided into 360 parts, the number of the parts occupied by each of the colors to be the following ; red, 45 parts ; orange, 27 ; yellow, 48 ; green, 60 ; blue, 60 ; indigo, 40 ; and violet, 80. These

different colored rays are not subject to further division. No change is effected upon any of them by being further refracted or reflected ; and as they differ in refrangibility, so also do they differ in the power of inflection and reflection. The violet rays are found to be the most reflexible and inflexible, and the red the least.



SOUTHERN CORN-SHELLER.

The machine here represented is sometimes called the Virginia corn-sheller, and is mostly used in Virginia and Maryland, where are cultivated very extensive corn fields. Here it is invaluable from the despatch with which it operates. It may be worked by one or two men, or by horse power. By manual labor it will shell three hundred bushels in a day, and by horse seven hundred bushels. It separates the cobs from the corn, leaving both unbroken, and in the best condition. It is of simple construction and not liable easily to get out of order.

SPIDERS. In England, and the more densely populated parts of our own country, where all the insect tribes are kept under by human assiduity, the spiders are but small and harmless. We are acquainted with few but the house spider, which weaves its web in neglected rooms ; the garden spider, that spreads its toils from tree to tree, and rests in the centre ; the wandering spider, that has no abode like the rest ; and the field spider, that is sometimes seen mounting, web and all, into the clouds. These are the chief of the spiders known to us, which, though reported venomous, are entirely inoffensive. But they form a much more terrible tribe in Africa and in Central America. In those regions, where all the insect species acquire their greatest growth, where the butterfly is seen to expand a wing as broad as our sparrow,

and the ant to build a habitation as tall as a man, it is not to be wondered at that the spiders are seen bearing a proportionable magnitude. In fact, the bottom of the Martinico spider's body is as large as a hen's egg, and covered all over with hair. Its web is strong, and its bite dangerous. It is happy for us, however, that we are placed at a distance from these formidable creatures, and that we can examine their history without feeling their resentment.

SPINAGE. This plant is a native of Persia, and has been cultivated in Europe, as an esculent, for about two centuries. The root is annual; the stem herbaceous, smooth, upright, a foot or more high, and somewhat branching; the leaves alternate, petiolate, and narrow shaped; the flowers small and greenish, disposed in several little branches, in the axils of the superior leaves; in short, the whole plant much resembles some of the species of goose-foot, to which genus it is allied in its botanical characters. It is eaten sometimes in salads, but more frequently cooked in various manners. It is a wholesome and agreeable aliment, but contains little nutriment, and is not suitable for delicate stomachs. The plant is of the easiest culture, and may be procured nearly all the year round, by sowing at intervals of time. It requires a rich soil, and frequent watering in dry weather.

SPINNING. When the fibres of cotton, wool, or flax, are intended to be woven, they are reduced to fine threads, of uniform size, by the well known process of spinning. Previously to the middle of the last century, this process was performed by hand, with the aid of the common spinning wheel. Locks of cotton or wool, previously carded, were attached to a rapidly revolving spindle, driven by a large wheel, and were stretched or drawn out by the hand, at the same time that they were twisted by the spindle, upon which they were afterwards wound. Flax, the fibres of which are longer and more parallel, was loosely wound upon a distaff, from which the fibres were selected and drawn out by the thumb and finger, and at the same time were twisted by flyers, and wound upon a bobbin, which revolved with a velocity somewhat less than that of the flyers. The manufacture of flexible stuffs by means of machinery, operating on a large scale, is an invention of the last century. Although of recent date, it has given birth to some of the most elaborate and wonderful combinations of mechanism, and already constitutes, especially in England and in this country, an important source of national wealth and prosperity. The character of the machinery which has been applied to the manufacture of cotton, at different times, has been various.

There are, however, several leading inventions, upon which most of the essential processes are founded, and which have given to their authors a greater share of celebrity than the rest. There are, *First*, the spinning jenny. This machine was invented by Richard Hargreaves, in 1767, and, in its simplest form, resembled a number of spindles turned by a common wheel, or cylinder, which was worked

by hand. It stretched out the threads as in common spinning of carded cotton. *Second*, the water spinning frame, invented by Richard Arkwright, in 1769. The essential and most important feature in this invention, consists in the drawing out or elongating of the cotton, by causing it to pass between successive pairs of rollers, which revolve with different velocities, and which act as substitutes for the finger and thumb, as applied in common spinning. These rollers are combined with the spindle and flyers of the common flax wheel. *Third*, the mule. This was invented by Samuel Crompton, in 1779. It combines the principles of the two preceding inventions, and produces finer yarn than that which is spun in either of the other machines. It has now nearly superseded the jenny. *Fourth*, the power loom, for weaving by water or steam power, which was introduced about the end of the eighteenth century, and has received various modifications.

The foregoing fundamental machines are used in the same or different establishments, and for different purposes. But, besides these, various auxiliary machines are necessary to perform intermediate operations, and to prepare the material as it passes from one stage of the manufacture to another. The number of these machines, and the changes and improvements which have been made in their construction from time to time, render it impossible to convey, in a work like the present, any accurate idea of their formation in detail.

SPONGE. A marine production, generally to be met with in the shops in pieces only. Its texture is cavernous and porous. Its great elasticity, and its property of imbibing, and as readily parting with, a large quantity of water, render it useful. Sponge is to be chosen as light as possible, perfectly clean, and free from stone, of as pale a color as may be, with small holes, and fine, and soft to the touch. It grows in the Archipelago, at considerable depths, on the rocks, about some of the islands there; and multitudes of people make a trade of diving for it. It is also common in the Mediterranean and many other seas, though in general browner or yellower, and not so fine as that of the Archipelago. It adheres in large masses to rocks and stones, sometimes to large shells, and is either round, flat, or hollow, like a funnel. There has been much dispute among naturalists concerning the real nature of the sponge; nor is it yet satisfactorily decided whether it belongs to the animal or vegetable kingdom. But it appears to be destitute of irritability, as well as of any locomotive power; and some recent writers have maintained that it is during a part of its existence a vegetable, and during the rest an animal. The opinion that sponge is, like coral, the work of a polype, is erroneous.

SPRINGS. In order to prove that the vapors raised by the heat of the sun from the surface of the seas, lakes, and rivers, are abundantly sufficient to supply the springs and rivers with fresh water, Dr. Halley made the following experiment: he took a vessel of water, made of the same degree of saltness with that of the sea, by means

of the hydrometer ; and having placed a thermometer in it, he brought it, by means of a pan of coals, to the same degree of heat with that of the air in the hottest summer. He then placed his vessel, with the thermometer in it, in one scale, and nicely counterpoised it with weights in the other ; after two hours, he found that about the sixtieth part of an inch was gone off in vapor, and, consequently, in twelve hours, the length of a natural day, one tenth of an inch would have been evaporated. From this experiment it follows, that every ten square inches of the surface of the water yield a cubic inch of water in vapor per day, every square mile 6,914 tons, and every square degree, or sixty-nine miles, thirty-three millions of tons. Now, if we suppose the Mediterranean to be forty degrees long, and four broad at a medium, which is the least that can be supposed, its surface will be one hundred and sixty square degrees, from whence there will evaporate five thousand two hundred and eighty millions of tons per day, in the summer time. The Mediterranean receives water from the nine great rivers following, viz : the Iberus, the Rhine, the Tiber, the Po, the Danube, the Neister, the Borysthenes, the Tanais, and the Nile, all the rest being small, and their waters inconsiderable.

Now let us suppose that each of these rivers conveys ten times as much water to the sea as the Thames ; which, as is observed, yields daily 76,032,000 cubic feet, which is equal to two hundred and three millions of tons ; and therefore, all the nine rivers will produce eighteen hundred and twenty-seven millions of tons ; which is little more than one-third of the quantity evaporated each day from the sea. The prodigious quantity of water remaining, the doctor allows to rains, which fall again into the seas, and for the uses of vegetation. As to the manner in which these waters are collected, so as to form reservoirs for the different kinds of springs, it seems to be this—the tops of mountains, in general, abound with cavities, and subterraneous caverns, formed by nature to serve as reservoirs ; and their pointed summits, which seem to pierce the clouds, stop those vapors which fluctuate in the atmosphere, and being constipated thereby, they precipitate in water, and by their gravity, easily penetrate through beds of sand and lighter earth, till they are stopped in their descent by more dense strata, as beds of clay or stone, where they form a basin or cavern, and work a passage horizontally, and issue out at the side of the mountain. Many of these springs running down by the valleys, between the ridges of hills, and uniting their streams, form rivulets or brooks ; and many of these, again, uniting on the plain, become a river.

STARCH. If a quantity of wheat flour is formed into a paste, and then held under a very small stream of water, kneading continually till the water runs off from it colorless, the flour, by this process, is divided into two distinct constituents. A tough substance, of a dirty white color, called gluten, remains in the hand ; the water is

at first milky, but soon deposits a white powder, which is known by the name of starch.

STARS, FIXED. The universe, so far as human observation has extended, consists of infinite or boundless space, in which are numberless fixed stars, of the nature, bulk, and properties of the sun ; but because they are at such immense distances from the earth, they appear to our eyes only as so many beautiful shining points. They are called fixed stars, because they do not change, like the planets, their relative position ; and they are distinguished from the planets by their twinkling light. It is supposed that the fixed stars have primary and secondary planets revolving round them, as the planets of our system revolve round the sun. Were the sun so far from us as these stars are, it would doubtless appear as they now do. It is certain that they do not reflect the sun's light as do the planets ; for their distance is so great that they would not, in that case, be visible. All the fixed stars, with the exception of the polar or north star, notwithstanding they do not change their relative position, appear to have a motion like the sun and moon, rising in the east, increasing in altitude until they approach the meridian, and declining to the western horizon, where they disappear. This apparent motion is caused by the revolution of the earth on its axis from west to east.

The immovable appearance of the polar star, is occasioned by the axis of the earth pointing directly to it. Its elevation above the horizon of any place, is always equal to the latitude of that place, or its nearest distance to the equator. The number of fixed stars visible to the naked eye, in either hemisphere, is not more than a thousand. They seem indeed to be innumerable, when, in a clear winter's evening, we turn our eyes towards the heavens. But by looking attentively, we shall find that most of those bright spots, which appeared to be stars, vanish from our view. This illusion is owing to the twinkling light with which the fixed stars are seen ; and, to our viewing them confusedly, and not reducing them to any order.

STATURE. The height of an animal. It is a known fact, that people in younger life are taller in the morning than at night, owing to the pressure of the upper parts in the daytime while the person is in an upright posture, on the cartilages between the vertebre of the neck and back ; which cartilages, by their spring, resume their tone and former dimensions in the horizontal position of the body during sleep ; the incumbent weight or pressure being, for that interval, and during that posture, removed. But it is not so with the aged : the cartilages in them are grown dry, and thin, and springless ; by reason whereof their stature will constantly continue at the lowest pitch. And as the interstices of the vertebre are consequently enlarged, the head, by its weight, will moreover naturally fall forward, and a bending in the back ensue. Hence old persons are never so tall as they were in their prime.

STEEL. In the Arts, a most valuable metal, consisting of iron combined with carbon. It is chiefly used for edge tools, and other cutting instruments, and from its fine polish is used in ornaments of various kinds. In Chemistry it is called a carburet of iron. Its hardness is greater than that of iron; and its most valuable property is, that it can be made harder than any other metal, by suddenly cooling it when heated to redness; also, if it is heated to a lower temperature than redness, and suddenly cooled, it becomes the most elastic of all the metals. It is of a darker color when polished, and retains its polish much longer, not being so liable to oxydate.

Steel is manufactured by two processes, one in which the steel is made from pig-iron at once in the finery; this is practised in Germany, and is called natural steel. Cemented steel is formed by stratifying bars of iron with powdered charcoal in a close vessel, and by keeping the mass at a brisk red heat for a longer or shorter time, depending upon the size of the bars. This process is called conversion. The test of the conversion being complete is its blistered appearance, from which it has been called blistered steel. As the steel in this change does not undergo fusion, all the imperfections in the mechanical texture of the iron will still be found to exist in the steel. Cast steel is blistered steel fused and cast into ingots, which are afterwards drawn into rods by the hammer, or by rolling. By this change the steel becomes much harder, and of course entirely free from those seams and other defects which exist in the blistered steel; this is what renders cast steel so much better for polished goods; for when blistered steel is attempted to be polished, the surface is seen to abound with numerous spots, arising from mechanical defects in the bars previous to conversion.

Cast steel works much harder under the hammer, and will not bear much more than a red heat, without breaking in pieces under it. This, however, is more especially confined to that commonly made; since cast steel may be made which will bear a white and even a welding heat; but it requires a much greater heat for its fusion, and would in consequence be sold at a much higher price. The refuse of blistered or common steel is generally melted into cast steel; but this is not of the best quality. The best cast steel is made by melting the bars of blistered steel, which, for this purpose, are a little more converted than for ordinary purposes, in order to give the steel a little more carbon than if it were used in the state of blistered steel. The bars are broken into small pieces, for the purpose of stowing the greatest quantity in the crucible.

STOCKING. That part of the clothing of the leg and foot which immediately covers and screens them from the rigor of the cold. Anciently, the only stockings in use were made of cloth, or of milled stuffs sewed together; but since the invention of knitting and weaving stockings of silk, wool, cotton, and thread, the use of cloth stock-

ings is quite discontinued. Dr. Howel, in his History of the World relates, that Queen Elizabeth, in 1501, was presented with a pair of black knit silk stockings by her silk woman, and thenceforth she never wore cloth ones any more. The same author adds, that King Henry VIII. ordinarily wore cloth hose, except there came from Spain, by great chance, a pair of silk stockings. His son, King Edward VI., was presented with a pair of long Spanish silk stockings by Sir Thomas Gresham, and the present was then much taken notice of. Hence it should seem, that the invention of knit silk stockings originally came from Spain. Others relate, that one William Rider, an apprentice on London Bridge, seeing at the house of an Italian merchant a pair of knit worsted stockings from Mantua, took the hint, and made a pair exactly like them, which he presented to William, earl of Pembroke, and that they were the first of that kind worn in England, anno 1564.

The modern stockings, whether woven or knit, are formed of an infinite number of little knots, called stitches, loops, or meshes, intermingled in one another. Knit stockings are wrought with needles made of polished iron, or brass wire, which interweave the threads, and form the meshes the stocking consists of. At what time the art of knitting was invented, it is perhaps impossible to determine, though it has been usually attributed to the Scots, as it is said that the first works of this kind came from Scotland. It is added, that it was on this account that the company of stocking knitters, established at Paris, 1527, took for their patron St. Fiaere, who is said to have been the son of a king of Scotland. But it is most probable that the method of knitting stockings by wires or needles was first brought from Spain.

Woven stockings are generally very fine; they are manufactured on a frame or machine made of polished iron. The invention of this machine is by Mr. Anderson attributed to William Lee, M. A., of St. John's College, Cambridge, at a period so early as 1589. Others have given the credit of this invention to a student of Oxford at a much later period, who, it is said by Aaron Hill, was driven to it by dire necessity. This young man, falling in love with an innkeeper's daughter, married her, though she had not a penny, and he by his marriage lost a fellowship. They soon fell into extreme poverty; and their marriage producing the consequences naturally to be expected from it, the amorous pair became miserable, not so much on account of their sufferings, as from the melancholy dread of what would become of their yet unborn infant. Their only means of support were the knitting of stockings, at which the woman was very expert. While sitting constantly together from morning to night, and the scholar often fixing his eyes with steadfast observation, on the motion of his wife's fingers in the dexterous management of her needles, he took it into his imagination that it was not impossible to contrive a little loom which might do the work with much more ex-

pedition. This thought he communicated to his wife, and joining his head to her hands the endeavor succeeded to their wish.

STOMACH PUMP. A small pump, in this application called the stomach pump, has lately been introduced into practice for removing poisons from the stomach in cases where the action of vomiting cannot be excited. It has already saved many lives. It resembles the common small syringe, except that there are two apertures near the end, instead of one, which, owing to valves in them, opening different ways, become what are called a sucking and a forcing passage. When the object is to extract from the stomach, the pump is worked while its sucking orifice is in connexion with an elastic tube, passed into the stomach; and the discharged matter escapes by the forcing orifice. When it is desired, on the contrary, to throw cleansing water or other liquid into the stomach, the connexion of the apertures and the tubes is reversed.

STRAW. In the manufacture of straw hats, the culms of several kinds of grasses are used. The Leghorn straw is the culm of a sort of wheat sown on poor soils, and cut green. Rye straw is much used in this manufacture. The straw is cut at the joints; and the outer covering being removed, it is sorted of equal sizes, and made up into bundles of eight or ten inches in length, and a foot in circumference. They are then to be dipped in water, and shaken a little, so as not to retain too much moisture; the bundles are afterwards to be placed on their edges, for the purpose of bleaching, in a box which is sufficiently close to prevent the evaporation of smoke. In the middle of the box is an earthen dish, containing brimstone, broken in small pieces; this is set on fire, and the box covered over and kept in the open air several hours. It is the business of one person to split and select the straws for fifty others who are braiders.

The splitting is done by a small machine, made principally of wood. The straws, when split, are termed splints, of which each worker has a certain quantity; on one end is wrapped a linen cloth, and they are held under the arm, and drawn out as wanted. Plaiters should be taught to use their second fingers and thumbs, instead of the fore fingers, which are often required to assist in turning the splints, and thus much facilitate the plaiting; and they should be cautioned against wetting the splints too much. The finest hats are made in the neighborhood of Leghorn, whence they are exported in great numbers. The Dunstable manufactures in Bedfordshire, England, are of a fine quality. In the English plait, the straws are flattened in a hand mill, previous to working; but in the Leghorn, the pressure is applied after the plaiting is made. In some portions of the United States the culture of straw for the manufacture of hats has been carried on to a considerable extent. This is particularly done in several towns in the vicinity of Boston. The articles manufactured are of great fineness and beauty; and the pecuniary product has often

been a most gratifying and honorable remuneration to the fair hands occupied in the labor.

STRAWBERRY. This is one of the most wholesome and most delicious of our fruits. The pulp is light, melting, and, notwithstanding, but little watery, and does not undergo the acetous fermentation in the stomach. It exhales a most delightful perfume, and the flavor is exquisite, especially immediately after being plucked from the stem. The root gives out several long, slender, creeping shoots, which take root at intervals, and form so many new stocks; the leaves are composed of three leaflets, supported on a long foot-stalk, which is provided with stipules at the base. From the midst of the leaves arise two or three simple, slender, silky stems from four to six inches high, and terminated by a few white flowers, disposed in a sort of corymb. After flowering, the receptacle increases, acquires a pulpy and succulent consistence, and finally a red color, when the strawberries have attained maturity.

The strawberry is easily cultivated, and numerous varieties have been produced; some of great excellence have been obtained recently. It forces well, and, with a little trouble in choosing a succession of sorts, may be had almost every month in the year. An open situation, and rich, loamy soil, rather strong, is required for most varieties; and from their large mass of foliage and flowers, they must, till the fruit is set, have copious supplies of water. The row culture is the most convenient, and frequent renewal insures vigorous plants and large fruit. A palatable jam, wine and vinegar are prepared from strawberries; and they are sometimes preserved entire, in syrup or in wine. Besides the cultivated strawberry, we have a wild species, common in most parts of the United States.

Modern skill and care have brought the strawberry into high repute. It now occupies a conspicuous position in most private gardens, while in some sections of the country it is extensively cultivated for market. One grower, in 1845, picked one hundred and twenty bushels daily at the height of the season. Under proper management, it can be made very profitable. Instances are on record of crops being at the rate of from one thousand to fifteen hundred dollars per acre; but the fair average product is probably not far from three hundred and fifty dollars, which is certainly a good return upon the investment. In fact, it is so productive and easy of cultivation, that it is really a matter of wonder why so many families are willing to do without it.

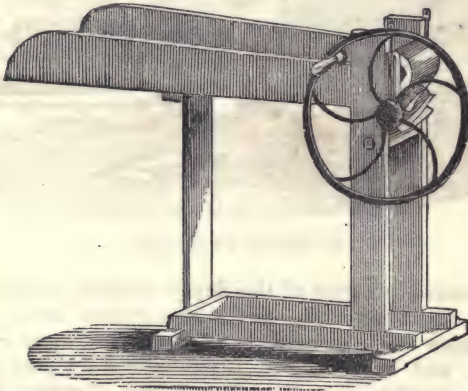
STRAW-CUTTER. Instruments for cutting straw, hay and cornstalks, are among the most useful inventions relating to agriculture. Their utility is two-fold. If fodder is put into mangers or spread out on the ground, no small part of it will be trodden under foot and greatly injured, if not ruined. Even what is put in mangers is liable to be drawn and scattered so as to be trampled upon. In

this way there is a saving in the quantity of the fodder. Also when it is cut cattle will fill themselves much quicker than if it were given to them without being cut. When they have filled themselves they lie down and rest, and digest what they have eaten. The action of the muscles in masticating their food is similar, in its effects on the system, to that of walking, and to that of oxen and horses in any kind of labor. If any animals are to be fattened, they must be kept comparatively quiet. If they are all the time exercising it will require double the food to sustain them, and it will be next to impossible to fatten. Will a man grow fat when constantly devoted to arduous muscular toil? All know to the contrary. If a man has a tendency to corpulence, he reduces his food in quality or quantity and increases his manual exercise. The idea of keeping animals at work all the time when desirous of increasing their flesh, is contrary to the experience of every farmer, and is absurd. And an incessant action of the masticating organs is much the same, in this respect, as an incessant action of the locomotive organs, in drawing the plough, the harrow, or the wagon.

Nor is this all. When food is made fine, more nutriment will be derived from it, than if conveyed to the stomach in a coarse state. Is it not universally known, that if the human species swallow their food before it is reduced to a fine pulpy state, it lies heavy in the stomach, fails to refresh and invigorate the system, and often leads to disease? All know this from their own experience. Why should it not be so with farm animals? It is so with them, perhaps in a less degree, because they are more able to sustain the evil. It is on this account that cooked or steamed food is more nutritious than that which is not cooked. In the one case all the juices are developed and assimilated to the animal tissues; in the other case, a portion of them is forced off through the alimentary canal, doing as little good as though it had at first been mixed with the compost heap instead of having been carried into the stomach; as little good as though it had been a corresponding amount of pulverized stones. A little reflection will satisfy any sensible person that this is so.

Cutting, bruising, grinding, fermenting, and cooking food, all tend much to fit it for easy and rapid digestion, and wherever it can be thus prepared, without too much expenditure of labor, it should be done. By adopting a mixed food, much of the coarser products can be worked up, which are now suffered to be added to the manure heap. Indeed, scarcely any of the vegetable productions of the farm need be suffered to run to waste, till they have first contributed all the nutriment they contain to the support of animal life. By chopping these fine, and properly cooking and seasoning them, they will be eaten with peculiar relish, easily digested, and go twice as far as in the ordinary method of feeding. Such a method of preparing food for farm animals is compared to mincing up the cold remains of a

dinner, meat, gristle, all sorts of vegetables and fragments of bread, which, on being well cooked together, will make a palatable and nourishing breakfast. No farmer should any more be without a good cutting machine for hay, straw, and corn stalks, than he would be without a plough or wagon. They may be had of any size ; and there is a variety of patterns ; all probably answering a tolerable purpose, although some are much better than others. That of Ruggles, Nourse, Mason & Co., is the best for ordinary use known to us. Besides other testimonials in its favor, in 1848, the State Agricultural Society of New York, and the American Institute, at their respective Fairs, awarded to it their first premiums.

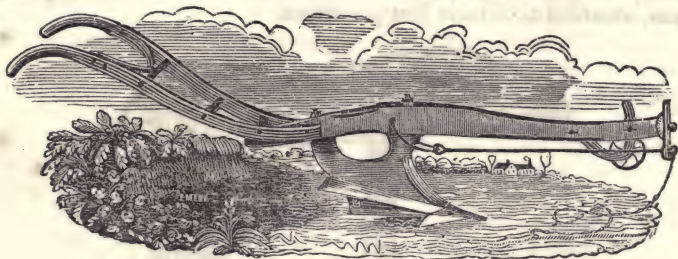


STRAW-CUTTER.

SUBSISTENCE. The food of all organized beings ; in vegetables, the air, water, and unctuous matter of the soil ; in animals the substance of matter prepared by vegetation ; and in carnivorous creatures the substance further prepared by animalization. The staff of human life is the starch, gluten, or albumen, of vegetables, as corn, rice, potatoes. These must always be at a price proportioned to the abundance of money and circulation, and to the remuneration for labor, or the population must perish ; and to decree that corn should be higher priced when money is scarce, and labor ill paid, is to pass sentence of death on the population. Of all trade, therefore, that in the necessities of life should be allowed to find its level in exact accordance with the means of consumers.

SUBSOIL PLOUGH. The subsoil plough takes its name from the office it is to perform ; to break up and loosen the subsoil—that is, the soil lying under the surface soil. Subsoil is merely the under soil. The utility of breaking up and loosening the subsoil is becoming one of the prominent features in modern agriculture. Although in

our country it has not become general, its utility is based on the soundest philosophical principles; and so far as it has been fairly tested the results have been most satisfactory and conclusive. By the use of the subsoil plough the hard sterile earth, is thoroughly pulverized, thereby being exposed to the meliorating influences of the atmosphere, and furnishing increased supplies of food and moisture in dry seasons, for the roots of the plants. These are the primary advantages of a deeply wrought loam, and they are certainly such as commend themselves to the attention of every reflecting farmer.



SUBSOIL PLOUGH.

Few persons are aware of the depth to which roots will descend in favorable situations. The fibrils of a wheat kernel have been found more than thirty inches below the surface; those of red clover, Indian corn, and the Swedish turnip, five feet; and sanfoin and lucern, from twenty to thirty feet! And long after they have become invisible to the naked eye, they can be detected by the microscope, pushing themselves away from the light. No one needs be told the object of these subterranean journeys. It is the constant effort of the good gardener to facilitate this wonderful operation of nature; he digs and trenches the soil to the depth of two or three feet, and he finds himself repaid by a luxuriant vegetation. Surely this is as important for the farmer as for the gardener. Sub-soiling secures a supply of heat and moisture for the plant. It is a well known fact, that in time of drought the vegetation of a garden will be more vigorous than in the adjacent field. This is mainly owing to the greater looseness of the soil. The minute particles of the surface and subsoils are gradually mixed together; the natural resources of the ground are awakened into life by the influence of the atmosphere; the threadlike web of roots with which it is filled, decay when the plant dies or is removed; and in time, the sterile, unprofitable substratum becomes a valuable loam of great depth and fertility. In some cases there has been from subsoiling a gain of from thirty to fifty per cent.

The subsoil plough much resembles the common plough without the mould board. As it is to operate in a soil of great hardness, per-

haps never before disturbed ; occasionally having to cut off roots and move large stones, it is apparent that it should be strongly made ; the materials of which it is composed to be of the best kind, whether wood or iron. It is always to be drawn by four, and sometimes by six oxen. Of course, unless firmly constructed, it is liable to be broken. In our first attempt at subsoiling, the implement—a new one—broke, and was completely disabled before the end of the first hour. We now use one of the Worcester manufacture, by Ruggles, Nourse & Mason ; if this breaks, we shall be much mistaken. The oak used in its construction, seems to be wholly unyielding, whatever force be applied to it.

SUCCESSION OF DAY AND NIGHT. By the daily motion of the earth on its axis, the same phenomena appear as if all the celestial bodies turned round it ; so that in its rotation from west to east, when the sun or a star just appears above the horizon, it is said to be rising, and as the earth continues its revolution, it seems gradually to ascend till it has reached its meridian ; here the object has its greatest elevation, and begins to decline till it sets, or becomes invisible on the western side. In the same manner the sun appears to rise and run its course to the western horizon, where it disappears, and night ensues, till it again illuminates the same part of the earth in another diurnal revolution.

One half of the earth's surface is constantly illuminated, and by its regular diurnal motion, every place is successively brought into light and immersed in darkness. If the axis of the earth were always perpendicular to the plane of the ecliptic, the days would every where be of the same length, and just as long as the nights. For an inhabitant at the equator, and one on the same meridian towards the poles, would come into the light at the same time, and on the other side would immerse into darkness at the same time. And since the motion of the earth is uniform, they would remain in the dark hemisphere just as long as in the light ; that is, their day and night would be equal—the plane of the ecliptic coinciding with the plane of the equator.

But as the ecliptic and equator make an angle with each other of twenty-three and a half degrees, or in other words, as the axis of the earth has such an inclination to the plane of its orbit, it is manifest that, except the earth be in that part of its orbit where the ecliptic cuts the equator, an inhabitant at the equator, and one on the same meridian towards the poles, will not come into the light at the same time, nor, on the other side, immerse into darkness, at the same time. And since the axis of the earth always preserves the same inclination, they will, except at the points where the two great circles intersect each other, remain in the dark and light hemispheres at different times ; that is, their day and night will be unequal. The points where the equator cuts the ecliptic are the beginning of the signs

Libra and Aries. The earth is at these points of its orbit, or, as is commonly said, the sun enters the sign Aries on the twentieth of March, and the sign Libra on the twenty-third of September. Hence at these periods, and at no others, the days and nights are equal all over the world; and on this account they are called equinoxes; the first, the vernal, and the second, the autumnal equinox.

At these seasons, the sun rises exactly in the east at six o'clock, and sets exactly in the west at six o'clock; the light of the sun is then terminated by the north and south poles, and as all parts of the earth turn round once in twenty-four hours, every place must receive the rays twelve hours, and be deprived of them for the same time. But at other seasons, where the rays of light are not terminated by the north and south poles, but extend over the one and do not reach the other, it must be manifest, from a moment's inspection of the circles drawn on globes, or common maps of the world, that day and night will be unequal in all places except those situated on the equator, where they will always be equal. At the poles there is but one day and one night in a year, each of six months. The sun can never shine beyond a pole farther than twenty-three and a half degrees; for that is the extent of the declination; and when it has declination from the celestial equator, either north or south, it must shine beyond one pole, and not to the other. The days, therefore, will be longest in one hemisphere when they are shortest in the other.

SUFFOCATION. The three ordinary modes of suffocation, or death by the interruption of the breath are, hanging, drowning, and the respiration of fixed air, or carbonic acid gas. The same result takes place from either of these causes, which is described under the article "Drowning," and the same process is required for the restoration of animation. In the instance of suffocation by carbonic acid air, whether arising from mines, lime kilns, or vats of fermenting liquor, the vital powers become more speedily extinct.

SUFFOLK CATTLE. The Suffolk cattle of Great Britain have, by Mr. Martin, a distinct head in his classification. They have sometimes been called the Suffolk duns, although dun is not their common color. With the improvements to which they have been subjected, other colors are generally preferred, as red, red and white, brindled, and yellowish or cream color. These cattle are supposed to owe their origin, with crossings, to the Galloways, and are chiefly valuable for their good milking qualities. A good Suffolk milking cow is inclined to be lean and spare, with a light thin head, slender, but short limbs, a heavy and well ribbed carcass, a large udder, and prominent milk veins. The hip-bones are high and conspicuous, the loins narrow, and the chine hollow. In the above respects the Galloway contour is not well marked.

A first rate Suffolk cow, will yield from six to eight gallons per day, in the best portion of the season. There is not an agreement of

opinion as to the quality of her milk ; some have ranked it high, others call it inferior ; the probability is, it has a medium quality. Mr. Youatt says that fifty thousand firkins of Suffolk butter are annually sent to the London market. When turned aside for the shambles, she is found to fatten with great ease. They are not of large size, probably on account of the early age at which the heifers are used for breeding. When fattened, however, the weight will vary from four hundred and fifty to five hundred pounds, and the meat is of good quality. The beef of the Suffolk oxen is excellent. Without much regard to their good points, the bulls are usually slaughtered at the age of three and four years, although it is supposed they would answer well their legitimate purpose till seven or eight years. Did the Suffolk dairymen pay the same attention to the improvement of their cattle that many other stock breeders do, particularly in preserving for a longer time their best animals, these polled Suffolks would be superior to what they now are.



SUFFOLK BULL.

SUFFOLK HOGS. It is stated in Youatt's treatise on the Pig, that there are no better swine in Great Britain than the improved Suffolks. Among the crosses of the native Suffolk which he specifies, are those of the Lincoln, the Berkshire, and Chinese. A cross between the Suffolk and the Lincoln has led to a hardy progeny, which fatten well, and will weigh from four to six hundred pounds. However, he gives preference to a cross between the Suffolk and

Berkshire, or Chinese. He says these are well formed, compact, short legged, hardy animals, equal in value to the best of the Essex, and superior in constitution, and consequently better adapted to the farmer. Those kept on the farm of Prince Albert, near Windsor, are of the improved Suffolk breed; that is, the Suffolk crossed with the Berkshire and Chinese. They are small in size, with round bulky bodies, short legs, small heads, and fat cheeks. Those arising from the Berkshire and Suffolk are not so well shaped as those from the Chinese and Suffolk, being coarser, longer legged, and more prominent about the hips. They are mostly white, with thin fine hair; some are spotted, and all easily kept in fine condition; and having a decided aptitude to fatten early.



SUFFOLK HOG.

The Rev. Mr. Rham, author of the Dictionary of Agriculture says the Suffolk breed of pigs is, perhaps, on the whole, the most profitable of any in England. Several years ago the late William Stickney, of Boston, introduced into our country this breed of animals; and, although they have not become extensively diffused, the results thus far are highly satisfactory to all who have seen them. It was said by one gentleman, highly competent to give a reliable opinion, that the pigs of this breed, at six weeks old, simply for being raised and fattened, are cheaper than the common country pigs at the usual prices. As the best ones have been generally kept for breeding, the

statistics of those slaughtered are not numerous. A few of them will satisfy any reasonable person of their excellence. A Mr. McCormick, of New Hampshire, slaughtered one, seven months and ten days old, that weighed three hundred and twenty-five pounds; a Mr. Stearns one, six months and ten days old, that weighed three hundred and ninety-four pounds; and Mr. Knapp, of Northampton, Massachusetts, one, at fifteen months, that weighed five hundred and fifteen pounds; and a Mr. Titcomb one, at nine months, that weighed three hundred and twenty-five pounds—also two at seven months and thirteen days, which weighed two hundred and sixty-two, and two hundred and ninety-six pounds.

SUGAR. A substance of a sweet and very agreeable nature, made of the juice of the sugar cane. Sugar was first brought from Arabia into Europe; and for many centuries was used not for food, but for medicine only. Among the Romans it was unknown before the reign of Nero. According to Ramsay's Review, the quantity of this article used in England, more than three-doubled from the year 1700 to 1790. A century ago, even the rich considered it as a luxury, and used it sparingly at their tables; now the poorest people think it a necessary of life.

SUGAR CANE. A pointed reed terminating in leaves or blades, whose edges are finely and sharply serrated. The body of the cane is strong, but brittle, and when ripe, of a fine straw color, inclinable to yellow; and it contains a soft pithy substance, which affords a copious supply of juice, of a sweetness the least cloying and most agreeable in nature. The length of the cane in very strong lands, is sometimes twelve feet; its general length, however, is from three and a half to seven feet; and in very rich lands the root has been known to put forth upwards of an hundred suckers or shoots. A pound of sugar from a gallon of the raw liquor of the cane, is reckoned in Jamaica very good yielding. A sugar plantation well conducted, and in a favorable soil, is computed to yield as many hogsheads of sugar annually, of sixteen hundred pounds weight, as there are negroes belonging to it. The average annual profits of sugar plantations in the West Indies, is not more than three or four per cent. on the capital. A portion of our own country is admirably adapted to the growth of the sugar cane, as already tested, particularly of Louisiana and other States of corresponding soil and meteorological influences. L. R. Allen, Esq., in his capital work, called the Book of the Farm, says in 1845 the product of sugar in the State named, reached the enormous quantity of 207,337,000 pounds, and about 9,000,000 gallons of molasses, worth nearly 15,000,000 dollars; being an increase of over ten times the quantity yielded thirty years before. Here the sugar crop is a profitable one.

SUGAR MAPLE. A handsome, clean tree, which gives a deep shade, and is excellent for fuel. The largest of these trees are five

and a half or six feet in diameter ; and will yield five gallons of sap in one day ; and from twelve to fifteen pounds of sugar, during the season. However, in some situations, and in some years, the yield is better than others. The younger and smaller trees afford sap or juice, in a still greater proportion. It is only during four or five weeks in the spring, that the juice can be collected. While the trees are frozen at night, and thawed in the day, the sap runs plentifully ; but as soon as the buds come on, the sap ceases to flow in such a manner as that it can any longer be collected. It would be excellent policy if all our farmers would cultivate the sugar maple, if it were only in reference to the wood and the beauty of the shade. Fifty of these trees should be transplanted, if not already there, to the grounds about the mansion ; and then, every one opposite his own lands should have the road-side ornamented with them. Some day the sap may be of value.

SULPHUR. An inflammable fossil, of which there are two species ; viz. common natural sulphur, and volcanic natural sulphur. The color of the natural sulphur is yellow, of different degrees of intensity ; it occurs massive, disseminated, and crystallized. The crystals are middle sized and small, of which the surface is smooth and splendent. Internally it is intermediate between shining and glistening. It is soft and frangible. When placed on inflamed coals, it burns with a bluish flame, and emits a pungent suffocating vapor, and is totally volatilized. It is found in many parts of the world. It is found in many parts of the world. It occurs commonly in masses, in gypsum, limestone, and marl ; and in some places with honeystone, and bituminous wood. It is often found in veins that traverse primitive rocks ; in veins of copper pyrites that traverse granite ; in Siberia it is found in the gold mines of Catherineburg, and in the lead glance veins in the Altain mountains. Humboldt mentions a province of Quito, in which he discovered a bed composed of sulphur and quartz, in a mountain of mica slate ; he likewise found great quantities of sulphur in primitive porphyry,

The volcanic natural sulphur is yellow, inclining to green ; it occurs sometimes corroded ; sometimes as a sublimate in flowers. It is glistening, and its lustre is resinous, inclining to adamantine. It occurs only in volcanic countries, where it is found in greater or smaller quantity among the lava. Solfatara, in the vicinity of Vesuvius, is one of the most famous repositories of natural volcanic sulphur, and is there collected in considerable quantities for the purposes of commerce. It is found also in Iceland, in *Ætna*, and in the Lipari islands. It occurs likewise in the island of Teneriffe, and in the West India islands ; in Java, and the East Indies.

SULPHURIC ACID. When sulphur is exposed to the temperature of three hundred and two degrees, it takes fire spontaneously, burns with a blue flame, yields a strong odor, and, by combining with

the oxygen or vital air of the atmosphere, has a tendency to destroy life, by suffocation. This vapor, which is composed of the volatilized particles of sulphur and oxygen, is called sulphuric acid.

SULPHUROUS ACID. A combination of sulphur with oxygen, in which the proportion of the latter is less than in the sulphuric acid; and it is a rule observed in all oxygenous mixtures, to distinguish those in which the larger quantity of oxygen is present, by the termination *ic*, and those in which the lesser, by the termination *ous*. Vapors of sulphur have the property of bleaching or whitening almost every substance with which they come in contact.

SUMACH. A plant that grows spontaneously in many parts of the United States; bearing a small red berry, which is useful as a dye, and has been discovered to be possessed of very powerful antiseptic qualities. It has long since been the practice among the natives of this continent, to substitute the sumach berry for tobacco, and the secret has been transmitted to Europe; in consequence of which it became so universally esteemed there by people of fashion and fortune, that large sums were offered to persons of mercantile professions, for this valuable but common production of nature. It has been preferred to the best manufactured Virginia tobacco. The method to be pursued in preparing the sumach to a state proper for smoking, is, to procure it in the month of November, expose it some time to the open air, spread it very thin on canvass, and then dry it in an oven, one-third heated. After having completed the process of cure thus far, spread it again on canvass, as before; and there let it remain twenty-two hours, when it will be perfectly fit for use. The branches of the elm-leaved sumach, when dried and reduced to a powder, are used in tanning Turkey or Morocco leather.

SUMMER. In Cosmography, one of the seasons of the year, commencing, in the higher northern latitudes, on the day the sun enters Cancer, and ending when it quits Virgo; or, more strictly and universally, the summer begins when the sun's meridian distance from the zenith is the least, and ends when it is a mean between the greatest and least.

SUN. The sun has ever been esteemed an object of the first importance in the solar system. Being the great source of light and heat, it diffuses its rays to every part of an immense sphere, giving life and motion to innumerable objects. Like its divine Author, while it controls the greatest, it does not overlook the most minute portions of the creation. According to the Copernican system, now universally received, the sun is the centre of all the planetary and cometary motions, all the planets and comets revolving round it in different periods, and at different distances. The sun, although stationary in respect to surrounding objects, is not destitute of motion. It turns on its own axis, from west to east, in about twenty-five days.

There has been much speculation concerning the physical organi-

zation of the sun. It was formerly supposed to consist of liquid fire, exhaustless in its nature ; which by constantly emitting rays in every direction, imparted a cheering influence to every part of the system. By modern astronomers this theory has been found untrue. They have supposed, with more plausibility, that it is a solid body, surrounded by a luminous atmosphere. It is estimated that the atmosphere with which the sun is surrounded, extends to the distance of two thousand miles from its surface ; and, that its density is at least eighty times greater than that which environs the earth. Herschel supposes that the density of the luminous solar clouds need not be greater than that of our aurora borealis, to produce the effects with which we are acquainted. Euler makes the light of the sun equal to 6500 candles at a foot distance.

The sun is a spherical body, and has a diameter of about 880,000 miles ; being more than equal to 100 diameters of the earth. So great is the power of gravitation upon its surface, that a body weighing one pound at the surface of the earth, will there weigh about thirty pounds. Thus a common sized man removed to the surface of the sun would weigh between two and three tons. On different parts of the sun's disc may be seen dark spots, called maculæ. These consist of a nucleus, which is much darker than the rest, surrounded by a mist or smoke ; and they are so changeable as frequently to vary during the time of observation. Some of the largest of them seem to exceed the bulk of the whole earth, and are often seen for three months together. They were first observed by the celebrated Galileo.

SUNDAY. The first day of the week ; thus called by our idolatrous ancestors, because set apart for the worship of the sun. It is sometimes called the Lord's Day, because kept as a feast in memory of our Lord's resurrection on this day ; and also Sabbath-day, because substituted under the new law instead of the Sabbath in the old law. Some are of opinion that the Lord's day, mentioned in the Apocalypse, is our Sunday ; which they believe was so early instituted by the apostles. Be this as it will, it is certain a regard was had to this day even in the earliest ages of the Church, as appears from the first Apology of Justin Martyr, where he describes the exercise of the day not much unlike to ours. But it was Constantine the Great, who first made a law for the proper observation of Sunday ; and who, according to Eusebius, appointed it should be regularly celebrated throughout the Roman empire. Before him, and even in his time, they observed the Jewish Sabbath as well as Sunday ; both to satisfy the law of Moses and to imitate the apostles who used to meet together on the first day. By Constantine's laws, made in 321, it was decreed, that for the future the Sunday should be kept a day of rest in all cities and towns ; but he allowed the country people to follow their work. In 538, the council of Orleans prohibited country labor ; but because there were still many Jews in Gaul, and the people fell into

many superstitious usages in the celebration of the new sabbath, like those of the Jews among that of the old, the council declares, that to hold it unlawful to travel with horses, cattle and carriages, to prepare food, or to do any thing necessary to the cleanliness and decency of houses or persons, savors more of Judaism than of Christianity.

SUNFLOWER. A genus of plants consisting of several species ; it has its name from its following the course of the sun. The common sunflower is easily propagated in any common soil, either by sowing the seeds, or by parting the roots in the month of March. The young flower-cups of this plant may be dressed and eaten like artichokes. It has appeared from experiments made in Pennsylvania, that a bushel of sunflower seed yields a gallon of oil, and that an acre of ground planted with the seed, at three feet apart, will yield between forty and fifty bushels of the seed. This oil is as mild as sweet oil, and is equally agreeable with it in salads, and as a medicine. It may also be used with advantage, in paints, varnishes, and ointments. The seed is raised with little trouble, and grows on land of moderate fertility.

SWALLOW. A common summer bird that seems ever on the wing. They fly in circles, seemingly in play, but actually in pursuit of little insects of the air which form their food. When the weather is fine these insects venture aloft, and the swallows follow them ; but when the air is filled with vapor, the insects and their pursuers fly near the earth. It has been doubted by some able naturalists, whether it is possible for the swallow to live inclosed with water and mud. "I saw an instance," says Dr. Williams, "which puts the possibility of the fact beyond all doubt. About the year 1760, two men were digging in the salt marsh at Cambridge, in Massachusetts ; on the banks of the Charles river, about two feet below the surface, they dug up a swallow, wholly surrounded and covered with mud. The bird was in a torpid state, but being held in their hands, it revived in about half an hour. The place where this swallow was dug up, was every day covered with the salt water ; which at every high tide, was four or five feet deep. The time when this swallow was found, was the latter part of the month of February." The species of this bird called the Chimney Swallow, has been found during the winter, in hollow trees. This curious fact has been put beyond all doubt, in Dr. Williams's History of Vermont ; which particularly describes two swallow trees, the one at Middlebury, and the other at Bridgeport. In those trees, the swallows used to have their winter residence ; issuing out about the first of May like swarms of bees.

SWAN. Is the most majestic and picturesque of all birds that swim in the waters. When it exhibits itself smoothly sailing along the stream, displaying its graceful attitudes, and moving forward without the smallest effort, a more beautiful figure can scarcely be found within the range of animated nature. This elegant bird admits

of two varieties, the wild and the tame swan; the former has a loud cry, which may be heard at a great distance, but the latter seldom emits any sound. The wild swan is smaller by about one-fourth than the tame kind, and also of a different color, its back and the tips of its wings being ash-colored; while the tame swan is remarkable for the delicate and uniform whiteness of its whole plumage. In Cumberland county, in New Holland, black swans are very common, and three of the species were in 1806 exhibited at Exeter 'Change, London.



SWAN.

The wild swan is a native of the arctic regions, and visits more temperate climates only when compelled by the severity of the cold. During the summer season they frequent the lakes of Lapland, in common with the numerous flocks of other aquatic fowl; there it also breeds and rears its young. Of the tame swan, any minute description is unnecessary; to give some idea of its size, it is sufficient to say, that it grows to the weight of upwards of twenty pounds. Its majestic appearance has been already noticed; and it is not less remarkable for the delicacy of its appetite than the elegance of its form; its food consists of corn, with herbs and roots that grow in the water, or are found near the margin.

SWEET POTATO. This plant is a native of the East Indies, but is now cultivated in all the warmer parts of the globe, and has produced numerous varieties. Formerly the roots were imported into England from the West Indies by the way of Spain, and sold as a

delicacy. It is the potato of Shakespere and contemporary writers, the common potato being then scarcely known in Europe. The roots are fleshy and spindle shaped, giving rise to herbaceous vines, which take root at intervals; the leaves are smooth, varying in form, but usually hastate, or three lobed; the flowers are white externally, and purplish within, disposed in clusters upon axillary foot-stalks.

In Warm climates, the culture is very easy, and they are obtained almost throughout the year, by planting at different periods. In northern climates, the culture becomes more difficult; but one variety succeeds even in the vicinity of Paris. Considered as an aliment, the sweet potato is very nutritious, wholesome, and easy of digestion. The consumption is very considerable, especially in the warmer parts of America, where even several savage tribes have introduced it, on account of its easy culture. In the United States, it is very little cultivated north of New Jersey, and even there is inferior in quality to those which grow in Carolina.

SWIMMING. Swimming has with great propriety been pronounced "the purest exercise of health;" combining in itself the advantages of muscular exertion with those of bathing. It is to be observed, however, that there is, perhaps, no exercise which calls into violent action a greater number of muscles, and which, therefore, so quickly induces fatigue. It is on this account, independent of the effects of the cold water in which the body is immersed, an amusement but ill adapted to the aged, and those of an enfeebled and delicate constitution. Even by the young, the healthful, and robust, it should not be carried too far, lest injury, rather than benefit result from it.

Immediately on leaving the water, the body should be always wiped perfectly dry by friction with a coarse towel; and after dressing, a gentle degree of exercise ought to be taken. Nothing is indeed more prejudicial to health, than sitting, or remaining inactive, subsequently to bathing. Walking briskly to and from the place selected for swimming, particularly if it be at a reasonable distance from the dwelling, will in most cases be the best exercise that can be adopted, both before entering, and after coming out of the water. It was not our intention, in the present article, to teach the art, or to describe the various modes of swimming. With Franklin, Saint Pierre, Saltzman, and others, we are of opinion, however, that such instruction should constitute an item in the education of every child, not merely to enable him to enjoy a beneficial exercise, but to insure his own safety, and to enable him to minister to that of others, in cases of accidental submersion.

TADPOLE. The young of the frog is called by this name. It is produced from an egg, and is extremely unlike the animal it is to perpetuate, seeming to consist of head and tail only. The head is large, black, and round, the tail slender, and margined with a broad,

transparent fin. Its motions are very lively. Its food consists of small water plants and different animalculæ. The mouth has very minute teeth. About five or six weeks after it is hatched, the first change takes place. The hind legs first appear, and, gradually increasing in length and size, are succeeded, in about two weeks, by the forelegs, which are formed at an earlier period beneath the skin. The tail now decreases, so that in a day or two, it is quite obliterated. After this change, the animal leaves the water and reposes upon the shore. Sometimes they are there seen in countless multitudes. The appearance of so many young frogs has probably induced the popular but groundless belief of their having fallen from the clouds in showers. Tadpoles, just after they are hatched, are perfectly transparent; and when placed before the double microscope, the pulsations of the heart may be easily seen, and the blood protruded thence, may be observed in its passage through the whole body.

TALLOW. This is an animal substance, or fat, melted from the membranous matter which is naturally mixed with it. When pure, tallow is white, and nearly tasteless; but the tallow of commerce usually has a yellow tinge. A very large proportion of the tallow that becomes an article of export from the country where obtained, is furnished by Russia, which annually exports 250,000,000 pounds, mostly furnished by the steppes of Southern Russia. The cattle are brought by thousands, driven to the salgans, or tallow factories, and there fattened and slaughtered. After the animals are slaughtered and skinned, a little of flesh and intestines are removed, and the rest of the carcase, cut into pieces, is thrown into the boilers, of which there are from four to six in every salgan, each large enough to contain the flesh of ten or fifteen oxen. During the boiling, the fat, as it collects on the top, is skimmed off with large ladles, and before it is quite cold, it is poured into the casks in which it is afterwards shipped. The first fat which comes off is the best, and is quite white, while that which follows has a yellowish tinge; and a still coarser tallow is obtained by squeezing the bones and flesh in presses.

An ox, in prime condition, will yield from two to three hundred pounds. The merchants of St. Petersburg divide the tallow which they receive from the interior, into white and yellow candle tallow, and common and Siberian soap tallow; the latter, which is considered the best tallow for soap-making, being brought by water transit from Siberia. Yellow candle tallow, when good, should be clear, dry, hard when broken, and of a fine yellow color throughout. The white candle tallow, when good, is white, brittle, hard, dry, and clean. The best white Russia tallow, is brought from Woronesch. In our own country and England, tallow is obtained, as in Russia, from the melted fat of cattle and sheep. With the fat, however, there is left remaining as little meat as possible, as that is worth more to be cooked for food, than to be boiled with the fat for tallow. The membranous

matter remaining, after the fat is extracted, called scraps or graves, on being macerated in warm water, softens and swells, and becomes a wholesome and palatable article of food for poultry, dogs, and other domestic animals. It is extensively used in fattening poultry, and sometimes swine, for market.

TALIPOT. A remarkable tree, that grows in the greatest luxuriance in the island of Ceylon. Robert Knox, who is said to have given the best account extant of Ceylon, tells us, that one of the leaves of the talipot is capable of covering ten persons. When it is dry, continues he, it is at once strong and pliant, so that you may fold and unfold it at pleasure, being naturally plaited like a fan. In this state, it is not bigger than a man's arm, and extremely light. The natives cut it into triangles, though it is naturally round, and each of them carries one of those sections over his head, holding the angular part before, in his hand, to open for himself a passage through the bushes. The soldiers use this leaf as a covering to their tents. They consider it, and with good reason, as one of the greatest blessings of Providence, in a country burnt up by the sun, and inundated by the rains, for six months of the year.

TALLOW TREE. There are various plants whose expressed oil is sufficiently thick, and in sufficient abundance to answer the purpose of tallow, and to be employed instead of animal oil, in the manufacture of candles, and which are hence called tallow trees. It is about the height of a cherry tree, its leaves in form of a heart, of a deep shining red color, and its bark very smooth. Its fruit is enclosed in a kind of pod, or cover, like a chestnut, and consists of three round white grains, of the size and form of a small nut, each having its peculiar capsule, and within a little stone. This stone is encompassed with a white pulp, which has all the properties of true tallow, both as to consistence, color, and even smell, and accordingly the Chinese make their candles of it; which would doubtless be as good as those in Europe, if they knew how to purify their vegetable, as well as we do our animal tallow. All the preparation they give it is to melt it down, and mix a little oil with it, to make it softer and more pliant. It is true, their candles made of it yield a thicker smoke, and a dimmer light than ours; but those defects are owing, in a great measure, to the wicks, which are not of cotton, but only a little rod of dry wood covered with the pith of a rush wound round it; which, being very porous, serves to filtrate the minute parts of the tallow, attracted by the burning stick, which, by this means, is kept alive. In like manner, the Americans make wax candles of the waxy berry of the candle-berry myrtle, which burn with a fine clear light, for a long time, and possess a fragrant myrtle odor.

TAMARINDS. Of the two species of the genus *Tamarindus* the fruit is much larger in the East Indian than the West Indian. The shell being removed, there remains the flat, square hard seed,

imbedded in pult, with membranous fibres running through it. In the East Indies the pulp is either dried in the sun, and used for home consumption, or with salt added, it is dried in copper ovens; this kind is that sent to Europe and this country. This sort, called natural tamarinds, is much darker and drier than the West Indian, which are called prepared tamarinds. The West Indian tamarinds reach maturity in June, July, and August, when they are collected, and the shell being removed, they are put into jars, either with layers of sugar put between them, or boiling syrup poured over them, which penetrates to the bottom. Prepared tamarinds therefore possess much more saccharine matter than others.

TANKS. The importance of collecting rain-water for domestic purposes, especially in districts where springs are deficient or lie at a great depth, has been much overlooked in our country. Mr. Waistell, an English gentleman, urges, in a forcible manner, the importance of placing spouts round all the buildings of a farm to collect the rain-water which falls upon them into a tank or tanks; observing that, besides the value of the supply of water thus obtained, the buildings will be benefited by the walls and foundations being kept drier than when the water from the roof is suffered to fall upon them. He states that the quantity of water that falls annually upon every hundred superficial or square feet is about fourteen hundred gallons. Upon this calculation a dwelling house thirty by forty feet and a barn fifty by thirty, a horse stable and carriage house twenty by twenty-five feet, a corn house twelve by eighteen feet, and a moderate sized shed, will catch in the year fifty thousand gallons, affording a constant supply of more than four barrels for each day in the year.

Most farmers might make arrangements for a much greater quantity. This would certainly be an easy method of supplying a stock of cattle as well as a family with all the water needed, if the wells were deficient, or there were on the premises no living springs. The expense of tanks or cisterns, independent of the labor furnished by each farmer for himself, would be inconsiderable. Most farmers have an abundance of small stones, as good or better than brick, so that money would have to be paid out only for the cement and mason work. If made below the surface of the ground, the water would be kept cool and fresh, and might be placed wherever most convenient, and not be in the way of any thing else. Rain-water thus kept, when filtered, is as good for any family purpose as the best of well or spring water. They should be of circular form, because that is more firm and unyielding against external pressure, with an arch at the top, and an opening just sufficient to admit a man to enter, in case cleansing or repairs are required.

TANNIN. A vegetable extract which combines with animal gelatine, forming a tough substance, and hence its use in converting skins into leather. Oak bark, and Leicester willow, yields one-six-

teenth of its weight, but other barks only a thirtieth or fortieth. Four pounds of good oak bark make one pound of leather; but one pound of catechu, or earth brought from Bengal, is equal to eight pounds of oak bark. By an immersion into tan liquor, which is an infusion of bark, the combination of the tannin with the organized gelatine, which forms the animal fibre, is slowly established; and the compound of tannin and gelatine not being soluble in water, and not liable to putrefaction, the skin is rendered dense and impermeable, and not subject to spontaneous change, which it would otherwise soon undergo. To render it equal throughout the whole substance of the skin, the action of the tan liquor must be gradual; and hence the tanning is performed by successive immersions of the skin in liquors of different strength. Sir H. Davy observes, that leather slowly tanned in weak infusions of bark, appears to be of better quality, being both softer and stronger than when tanned by dense infusions; and he ascribes this to the extractive matter which they imbibe.

TANNING. The preparation of skins, by means of which they are rendered into leather. The first part of this preparation consists in taking off the hair, which is effected by steeping in lime water. When this is done and everything superfluous is removed with the knife and the pumice, as in the preparation of parchment, the skin is put into the tan; that is, being stretched in a pit, it is covered with tan, and the pit filled with water. At Hunter, Greene county, New York, tanning has been carried on very extensively. The tannery has seven powerful water wheels, adapted to its various machinery. In one year, of which we have its statistics before us, 26,360 sides of sole leather were tanned in this establishment. They weighed 637,413 pounds, and were manufactured with the labor of forty-nine hands, and with 3,200 cords of bark.

TAPIOCA. This is an excellent article, well known in domestic economy, obtained from the farina of the roots of an American plant called Mandioc and Cassiva, and is used for puddings and other light food for invalids. Bread is also made from it. The plant is indigenous in tropical America, and is cultivated from Florida to Magellan, and in several countries of Asia and Africa. The stem is smooth and branching, and rises to the height of six or seven feet. It is easily cultivated, grows rapidly, and produces abundantly. The roots attain the size of a man's thigh, shaped somewhat like a parsnip; and two years are required to bring it to perfection. Every part of the plant is filled with a milky juice, which is a very violent and dangerous poison, bringing on death in a few minutes if swallowed; and it may well excite surprise that human ingenuity should have converted the roots into an article of food. The flour made from these roots, when kept free from moisture, continues good for fifteen or twenty years. It is very nutritious, half a pound a day being sufficient for

any one. The Creole women prefer bread made from it to wheat bread ; but for bread we consider it insipid.

TAPIR. The American tapir, when full grown, is six feet in total length, and about three and a half in height. In general form it resembles the hog ; but the legs are rather longer in proportion, and the nose is prolonged into a small movable proboscis. The fore feet have four toes, and the hind ones three only. The eyes are small and lateral, and the ears long and pointed ; the skin thick, and covered with scattering, short silky hairs ; the tail short, and slightly hairy. The teeth resemble those of the horse. It is the largest animal of South America, and is found in all parts of that continent, though most abundant in Guiana, Brazil, and Paraguay. It shuns the habitations of men, and leads a solitary life in the interior of the forests, in most situations, but selects for its abode a place somewhat elevated and dry. By travelling always the same rounds, it forms beaten paths, which are very conspicuous. It comes out only in the night, or during rainy weather, and resorts to the marshes. Its ordinary pace is a sort of trot ; but it sometimes gallops, though awkwardly, and with the head down ; and, besides, swims with facility. In the wild state, it lives on fruits and young branches of trees, but when domesticated, eats every kind of food. Though possessed of great strength, it makes use of it only for defence ; and its disposition is mild and timid. The flesh is dry and disagreeable tasted ; but the skin is very tough, and might be applied to useful purposes. The Indian tapir has only been discovered within a few years. It inhabits Sumatra, Malacca, and some of the surrounding countries. The colors are remarkable. The head, neck, feet and tail are black ; the rest of the body and tip of the ears white.

TAR. Tar is obtained from the wood and roots of various kinds of pine by the agency of fire ; it is too well known to need description ; that which is thinnest and blackest is the best. It is extensively manufactured in Norway, Sweden, Germany, Russia, North America, and other countries in which those trees abound. The mode of making tar in Sweden is as follows : a conical cavity is made in the ground, generally in the side of a bank or sloping hill ; the roots, as well as billets and logs of the fir, are packed into the cavity, when the whole is covered with turf, which is beaten down firmly upon the wood. The fire is then kindled, and a slow combustion takes place without flame. The tar exudes into a cast iron pan, at the bottom of the funnel, having a spout, beneath which barrels are placed to receive the tar. This process is the same, in fact, as that described by Theophrastus and Dioscorides, as practised by the ancient Greeks. Tar is made in France and Switzerland in ovens built for the purpose. Tar is used in medicine ; and for innumerable purposes in the arts. In England a vast amount of tar is wanted for the navy,

for which she is mainly dependent on Sweden for the supply, although she has attempted to produce it in her American colonies.

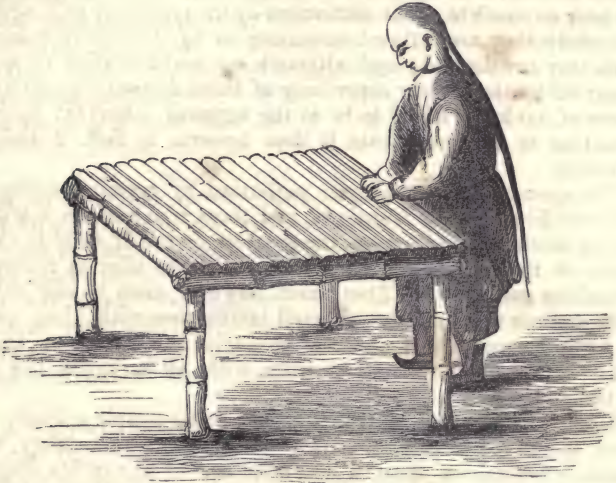
TATTOOING. Among all the known nations of the earth, none have carried the art of tattooing to so high a degree of perfection as the inhabitants of the Washington islands. The regular designs with which the bodies of the men of Nukahiwa are punctured from head to foot, supplies, in some sort, the absence of clothing; for, under so warm a climate, clothing would be insupportable to them. Many people here seek as much to obtain distinction by the symmetry and regularity with which they are tattooed, as among us by the elegant manner in which they are dressed; and although no real elevation of rank is designated by the greater superiority of these decorations, yet as only persons of rank can afford to be at the expense attendant upon any refinement in the ornaments, it does become, in fact, a badge of distinction.

The operation of tattooing is performed by certain persons, who gain their livelihood by it entirely, and those who perform it with the greatest dexterity, and evince the greatest degree of taste in the disposition of the ornaments, are as much sought after as among us a particularly good tailor. Thus much, however, must be said, that the choice made is not a matter of equal indifference with them as with us; for if the punctured garment be spoiled in the making, the mischief is irreparable; it must be worn, with all its faults, the whole life through.

TEA. The culture of tea in China seems simple enough. The plants are raised from seeds, sown in the places where they are to remain. Several are dropped into holes four or five inches deep, and three or four feet apart. The plants rise up in a cluster when the rain comes on, and require little further care, except of removing weeds, till they are three years old, when they yield their first crop of leaves. They are seldom transplanted, but sometimes four or five plants are put close together, so as to form a fine bush. After growing seven or ten years they are cut down, in order that the numerous young shoots which then spring out, may afford a more abundant supply of leaves. In some districts the bushes grow unrestrained, in others they are regularly pruned to keep them low.

The gathering of the leaves is performed with great care. They are usually gathered singly, first in March or May, according to the district, when the leaves are scarcely expanded; the second about two months later, or May and June; and the third in August, or about six months after the second; but the times necessarily differ in different districts, as well as the number of crops to be obtained; some avoid the third for fear of injuring the bushes. When the leaves are gathered they are dried in houses which contain small furnaces, on each of which there is a flat iron pan, and upon this, when heated, the leaves, partially dried by exposure to the sun, are thrown; which

then are to be frequently shifted and turned. When all are properly dried, they are quickly removed, either by the hand or with a shovel, and either thrown upon a mat or into baskets which are kept ready to receive them. They are then removed to a table where they are rolled and cooled, and the process is repeated; after which they are sifted and sorted into several varieties. The appearance of one rolling the leaves is like that of the baker kneading his dough.



ROLLING PROCESS.

Tea having become so extensive an article in domestic economy, and also in commerce, and a source of considerable revenue, various attempts have been made to introduce it into other countries; as in Rio Janeiro, and in the warm parts of Brazil, in Penang, Asam, and the Himalayas. Within the last few years, Junius Smith, LL. D., a gentleman well known for eminence in science and enterprise, has been engaged in experiments on its culture in our own country. Favorable reports are given of the teas grown in the East Indies, but as yet only small quantities of them are brought into market. The whole amount of teas raised, is enormous, almost surpassing credibility. Russia is annually supplied through Kiakhta with about seven millions of pounds; France requires two millions of pounds; Holland three millions; in 1850, it is estimated that twenty-three millions of pounds came to our own country; and in the same year, there were consumed, in the United Kingdom of the British Empire, over fifty millions of pounds.

TEAK. The teak tree is a native of different parts of India, as

well as of Birmah, chiefly along the banks of the Irawaddy, and of the islands of Ceylon to the Moluccas. The tree grows to an immense size, and is remarkable for its large leaves, which are from twelve to twenty-four inches long, and from eight to sixteen inches broad, and are compared, by Oriental writers, to the ears of the elephant. From extensive experience, teak timber has been found the most valuable timber for shipbuilding, and has been called the oak of the East. The wood is light, brownish colored, easily worked, but at the same time strong and durable. It is soon seasoned, and from containing a resinous oil, resists the action of the water, as well as insects of all kinds. Some of the finest ships that float, have been made from it.

Some interesting details have recently been published concerning the export of teak-timber from Moulmein, in India. Teak is the principal article of export from that province, both in quantity and value. During the year 1849, upwards of 25,000 tons were shipped to various parts of the world, all properly converted, by hand or machinery, and in the rough state estimated at 100,000 pounds. The teak of these provinces and the surrounding foreign states, which finds its way into Moulmein, is of very superior quality, and unequalled, for ship building purposes, by any other wood in the world. The annual supply is more than equal to the demand, in consequence of this port being but little known to the English ship owners and builders. There is almost an unlimited extent of teak forests in the neighboring states, of superior quality and easily worked.

TEMPERATURE. The presence of the sun is undoubtedly one of the principal sources of heat, as its absence is of cold; but if those affections of the atmosphere depended solely on these two causes, an equal temperature would, at the same seasons, prevail in all places situated under the same parallels. This, however, is far from being the case; for the temperature of the eastern coast of America, is far colder than that of the western shores of Europe, in the same latitudes; and the same observation may, with some degree of variation, be extended to the whole of these two continents. It is equally observable, that the tropical heats of Africa are far greater than those of the West India Islands, and some other parts of America, situated in the torrid zone; and, indeed, an abundance of proofs might be adduced, to show that the temperature of the air, in different countries, depends on a variety of circumstances besides geographical position.

One great source of heat exists in the earth; but whether this arises from any central fire, or from elementary heat diffused through the whole mass, is a problem of no easy solution. The warmth which the earth imparts to the atmosphere, tends greatly to moderate the cold; and it has, by various observations, been found that the same degree of heat exists in all subterraneous situations at the same depth, or at least, that the variations are extremely small. The condensation of vapor also is another cause of heat, of which, it is well known,

that vapor contains a great quantity. This condensation is often formed by the attraction of an electrical cloud, and hence arises that sultry heat which, in summer, is often felt before rain, and particularly before a thunder storm.

As the earth is the source of heat, distance from the earth must, consequently, be a cause of cold ; and, in confirmation of this theory, it is invariably found that cold increases in proportion to our elevation in the atmosphere. Hence we find, even under the equator, mountains of a certain height have their tops covered with snow. An elevation of five hundred yards produces the same effect as a distance of five thousand miles from the equator. Accordingly, at an elevation of thirteen thousand feet we find the frosts of the frozen zone ; and at fifteen and sixteen thousand feet, the mountains, based upon the most scorching plains, are capped with perpetual snow and ice.

The heat of the atmosphere is further augmented by the accumulation of the sun's rays at the surface of the earth. The rays are then reflected into the air and to surrounding objects ; so that the reflected heat is often greater than the direct heat of the sun. On this account, the heat in valleys, where the heat is reflected by hills and mountains, is sometimes very great. In an elevated valley in Switzerland, the heat is so much increased by reflection, that in the centre there is a spot of perpetual verdure, in the midst of perpetual snow and glaciers ; and there are plains on the Himmaleh mountains, fifteen thousand feet above the level of the sea, which produce fine pasturage ; and at the height of eleven thousand feet, which is above the region of perpetual snows on the Andes, in the same latitude, barley and wheat are known to flourish.

Countries that are uncultivated and covered with wood, are much colder than those which are open and cultivated ; as the former prevent the access of the solar rays to the earth, or to the snow which they may conceal, and also prevent a greater number of evaporating surfaces than the latter. To be convinced that the air of woody countries is rendered colder by the evaporation from the trees and shrubs, it is only necessary to observe that a thick shade of trees is cooler than the shelter of buildings. As the land is capable of receiving and retaining much more heat or cold, than water can imbibe, the vicinity of the sea is also a circumstance which considerably affects the temperature of the air. The sea therefore moderates the heat in warm climates, and the cold in higher latitudes. When the rays of the sun strike upon the water, they will penetrate six or seven hundred feet, if there be that depth ; and the heat will be diffused through the whole mass, remaining till carried off by evaporation. Consequently, in hot climates, the body of the ocean is much cooler than the land ; and in cold ones it is warmer.

TEMPERATURE OF THE EARTH. The circumstance of the earth being flattened at the poles and protuberant at the equator, is

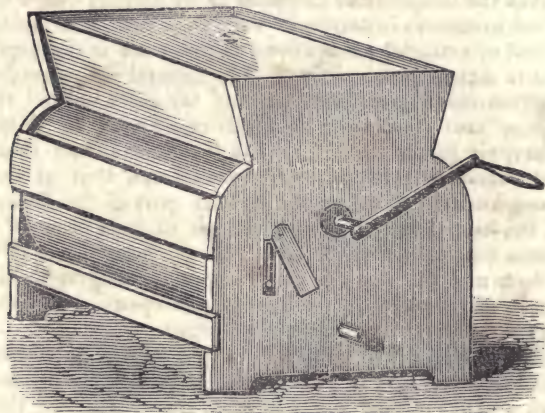
the natural and necessary result of its rotation on its axis. But in order that it might yield to the force resulting from such a motion, the matter of which it is composed must have been soft. Now, although water is capable of being compressed, and so far as we can judge, of taking any degree of density, according to the force exerted upon it, still the shape of the earth is not that which would have resulted from such a mass of water. There may be particular portions of the sea that extend to the depth of several miles, as there are particular points of the solid crust of continents, that rise to this height above the general level. Still we have reason to believe, that the average depth of the ocean does not much exceed three thousand feet.

It is thought that heat may have been the original cause of the fluidity of the earth, and that there may still remain enough to keep the interior portions in the same state. The more the subject has been examined, the more the evidence has accumulated in favor of the position that the temperature increases as we descend below the surface. There are numerous instances in which we have been able, by means of natural or artificial excavations, to penetrate to the depth of from thirteen to sixteen hundred feet. The general inference from all the observations made in different parts of the earth is, that there is an increase of heat amounting to about one degree of Fahrenheit for every forty-six feet in depth; that at the depth of ten thousand feet, the heat would be sufficient to boil water, and that at the depth of about one hundred miles, or one fortieth part of the distance to the centre, the heat would be intense enough to melt most of the earths and stones that are known to enter into the composition of the globe. These facts and inferences have an important bearing upon the phenomena of earthquakes and volcanoes, and open a wide field of speculation to the natural historian and geologist.

THERMOMETER CHURN. This churn has been so constructed that the cream or milk is readily brought to the desired temperature without mixing water or other substances, and the temperature certainly and definitely determined, which proves invaluable in the art of making butter. One improvement consists in the construction of a double bottom made in the form of a semicircle, of two sheets of zinc, or other metal, placed one above the other, the cream to rest upon the uppermost. Between the two sheets forming the bottom is a space, or chamber, into which may be introduced cold or warm water, as may be required to increase or diminish the temperature of the cream or milk. The water is easily applied by means of a common tunnel, through an aperture or hole in the side of the churn.

Another improvement is a thermometer permanently placed in one end of the churn, entirely secure from breaking or accident, marked at sixty-two degrees, and which is always visible, so that the operator may know and determine with certainty when the cream or

milk is brought to the proper temperature. If the cream or milk is too warm, the mercury will rise above the mark of sixty-two degrees, and cold water should be applied in the chamber described; if too cold, the mercury will fall below the mark, when warm water must be used instead of cold. The cream or milk should be stirred or agitated, by turning the crank, while the water is introduced, to give the cream or milk an equal temperature throughout. When the thermometer indicates that the cream or milk is of the proper temperature, the water may be drawn out through the tube placed for the purpose, when the churning should be performed by giving the crank about forty revolutions to the minute. By reversing the motion of the crank, it is liberated, when both it and the dasher, or floats, are drawn out. This being done, the churn is easily cleaned. The construction of this churn in all respects is simple; is not liable to get out of order, and can be used with ease.



THERMOMETER CHURN.

THIRST. Distinct from the first and most obvious purposes for which we take drink, viz., for allaying thirst, and for diluting the solid food taken into the stomach, there is another motive which has great influence over us all; and that is, to gratify the taste, and tickle the palate. Thirst is a sensation amounting at times to a real irritation or want felt in the throat and stomach. It is brought on by whatever stimulates these parts in such a way as to exalt sensation and diminish the customary discharge of fluids from their surfaces. Hence, thirst is excited by condiments and vinous spiritous drinks. This want is also greater by whatever stimulates the blood vessels and nerves of other parts, with which the stomach sympathizes; and on this account it is very urgent, in consequence of exposure to the

sun's rays, and in a heated atmosphere, which stimulates both the skin and the lungs. Burns will cause raging thirst; so fits of passion, by their exciting powerfully the nervous system, have the same effect.

Thirst thus brought on, and augmented by external heating and irritating matters, and by irritation in various parts of the animal economy; and when present, giving rise to increased heat and irritation of the functions generally, can of course be mitigated and removed but by one class of agents. These are of a cooling, soothing, and sedative nature. Cool air applied to the skin and inhaled into the lungs, or cold water applied to the extremities, will sometimes answer. A depressing emotion, as of sudden fear, will, by its prompt sedative action on the nervous system, produce the same result. But that which above all other means is best calculated to soothe the heated and irritated surfaces of the throat and stomach, and thus remove all the troublesome secondary symptoms, is to drink simple water, or the blander watery fluids. The instinctive want of such fluids for drink, is strongly pronounced from the lowest animal up to man. They soothe the irritated sentient surfaces affected in thirst; they furnish matter for the absorbents of these surfaces to carry into the circulation, and thus preserve the requisite proportion of water in the blood.

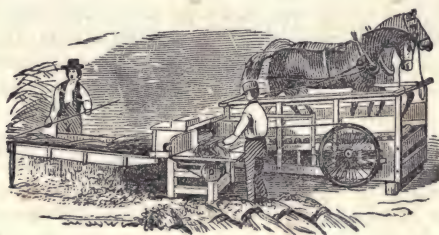
While simple aqueous moisture is the chief assuager of thirst, and that without which the want would soon become a raging inflammation and fever, leading to death, yet does temperature also exert a modifying influence. Coldness of the fluid contributes more effectually to allay the nervous irritation in extreme thirst; but, though agreeable at the moment, it is not essentially necessary, and is often hazardous, after the individual has been enfeebled by long and excessive exercise and labor. The safer plan in such a case, is to apply the cold fluid, iced or spring water, to the hands and face, and use for drink that which is of the temperature of the river or flowing stream. Even in hot weather, water of the temperature which it assumes when exposed to the air, is the best quencher of thirst, though not the most grateful to the taste. Very cold water taken into the stomach, in some cases deadens the senses and produces spasms, and even death. In the most favorable condition of the animal economy, it is apt, especially in vigorous habits, to give rise to great reaction, increased flow of blood and sensibility of the parts, and of course a fresh call for drink.

The lover of spiritous and fermented liquors, persuades himself that they are excellent quenchers of thirst and mitigators of heat; because he experiences relief from these sensations after he drinks them of an icy coldness. The benefit here was from the adventitious property of the liquor, viz., its coldness; but so soon as this has disappeared, then follows the stimulation and excitement from the alcoholic portion—the thirst is renewed, and if appeased in the same way,

soon returns with increased urgency ; and finally, the sipper of such liquors is at length brought into the fever of drunkenness, and is greatly surprised to find that his cold spirit and water, or cold wine, or beer, should heat him so excessively. The only element in most of these liquors, by which they at all palliate thirst, distinct from the effect of their artificial coldness, is water.

Next to simple water, and that with the addition of a little mucilage, the fluid, with a slightly saline impregnation, is useful in moderating thirst. Animals, especially herbivorous quadrupeds, usually so particular in taking no other drink but simple water, will often drink with avidity from a saline spring or lick. The vessels called absorbents, which drink up fluids to be carried into the circulation, to dilute the blood and aid in the various secretions, are usually very careful to exclude foreign matters ; but when they allow the entrance of these, it is saline substances, in minute proportions, in preference to all others.

But as few salts are pleasant to the taste, when they have been dissolved in water, it has usually been the practice to employ those solutions in which there is an excess of acid, as in the cream of tartar ; or what at the moment of their formation largely evolves fixed air, which stimulates agreeably the sense of taste, as in what are called soda and seidlitz powders. When we use them, we dissolve in one portion of water the acid, usually the tartaric ; and in another the alkali, combined with fixed air or carbonic acid in the form of a carbonate or bi-carbonate of soda. The tartaric acid unites with the soda, forming a salt, the tartrate of soda ; whilst the fixed air is disengaged from its combination with the alkali, and froths up in the glass at the moment of the mixture of the two solutions.



THRASHING MACHINE.

THRASHING. The act of beating out the corn from grain or other crops, is called thrashing. The flail was the implement formerly used in thrashing corn, and which separated the grain from the straw and husks very effectually and expeditiously ; but as it has now become expensive, where large quantities are raised, and always bruises a great many seeds, it has been attempted to avoid these inconveniences

by proper machines, provided with a number of flails, or other parts answering the same purpose, made to move by the power of water, wind, or horses. By this means the business of thrashing is found to be performed cheaper, more expeditiously, and with less damage to the health of the thrasher ; for it is well known that thrashing with flails is laborious in the extreme, and the dust constantly arising is injurious to the lungs. Thrashing machines have become quite numerous, each inventor endeavoring to obviate some fault in previous ones, and to introduce some new advantage not before accomplished. A correspondent of the *American Agriculturist*, living in Tompkins county, (N. Y.,) says : " Since I have owned one of Allen's machines, it has not cost me one bushel in twenty to thrash my grain. With two light horses, by changing them every hour, and with two men and a boy, I thrashed forty-five bushels of wheat in half a day. There are but few farmers who cannot thrash all of their grain on their rainy and leisure days, and incur very little expense, if they have a machine of their own.

THUNDER AND LIGHTNING. The surface of the earth, and of all bodies with which we are acquainted, is supposed to contain or possess a power of exciting or exhibiting a certain quantity of an exceeding subtle agent called the electric fluid. The quantity usually belonging to any surface is called its natural state, and it then produces no sensible effects ; but when any surface becomes possessed of more, or less, than its natural quantity, it is electrified, and it then exhibits a variety of peculiar and surprising phenomena ascribed to the power called electric.

If you take a stick of sealing-wax and rub it on the sleeve of your coat, it will have the power of attracting small pieces of paper, or any other light substances, when held near them. If a clean and dry glass tube be briskly rubbed with the hand, or with a piece of flannel, and then presented to any small light substances, it will immediately attract and repel them alternately for a considerable time. The tube is then said to be excited. If an excited glass tube, in a dark room, be brought within about half an inch of the finger, a lucid spark will be seen between the finger and the tube, accompanied with a snapping noise, and a peculiar sensation of the finger. Dry flannel clothes, when handled in the dark, frequently exhibit a sparkling appearance, attended with the same kind of noise that is heard in the experiment of the glass tube.

When any body is possessed of more than its natural quantity of electricity, it is said to be positively electrified ; and when possessed of less than its natural quantity, it is said to be negatively electrified. If two substances come in contact, one charged positively and the other negatively with electricity, so much of the fluid passes from the former to the latter, as to produce an equilibrium. Certain bodies have the power of transmitting electricity from one surface to another,

and are hence called conductors ; others not possessing this power are called non-conductors. Metals, ores, and fluids, in their natural state, excepting air and oils, are conductors ; vitrified and resinous substances, amber, sulphur, wax, silk, cotton, and feathers, are non-conductors.

From the similarity between lightning and the electric fluid, it had long been supposed that they were one and the same thing ; but it was left for Dr. Franklin to prove the truth of this supposition. When the clouds and the different terrestrial objects, over which they pass, are charged, one positively and the other negatively, in the passage of this fluid from the former to the latter, there is presented what we call lightning. So likewise, where two clouds come in contact, differently charged, the same result takes place. Thunder is the report which accompanies the taking place of this electrical union. It is occasioned by the rarefaction or displacing of the air, and its sudden return to its original position. Thunder and lightning bear the same relation to each other, as the flash and report of a cannon.

THUNDER ROD. This is a rod of metal attached generally to the side of a building, and extending from below the level of the ground, to a point several feet above the highest part of the roof of the building, in order to secure the edifice from the effects of thunder and lightning. The upper end of the rod terminates in a point, sometimes in several points. It is to Dr. Franklin that the world is indebted for the idea of raising pointed rods in order to secure buildings from the effects of atmospherical electricity ; and the recommendation was immediately adopted. These rods should be thick enough to convey the electric fluid to the ground without being melted by it ; and they should reach so far into the ground, as to relieve the building from danger of receiving the fluid from the lower extremity of them. It is surprising that so few farmers avail themselves of a protection against one of the most fearful calamities to which they are always liable, when several times every year they are shocked with the reports of persons killed and valuable property destroyed by it.

TILLAGE. This term, applied to arable land, signifies the stirring and preparing the soil, so as to render it fit for the vegetation of seeds ; and its object is to destroy the weeds as well as to make the soil mellow. The whole art of cultivation consists in tillage and manuring, and the profits of the husbandman depend on the perfection of this process, and the economy of labor in producing his crops. A defect in tillage, bad ploughing, or any other want of due preparation of the soil, will cause a deficiency of his crops ; and, if such defect be perpetuated for a course of years, most land will become incapable of yielding enough to remunerate for the labor bestowed upon it. To ensure remunerating crops, the soil should be in such a state that the rains and dews may readily be diffused through it, without giving it a wet appearance, or evaporating too rapidly. The effect of deep tillage is most remarkable. This may be seen in the use of the spade upon

garden lands, and in the use of the subsoil plough, for all kinds of field culture. What would grow in the garden if the soil were loosened only to the depth of three or four inches ! To raise garden vegetables on such a soil, would be deemed absurd ; and the attempt to do it presumption. The principle is the same in field culture. Good tillage is the secret of successful farming.

TIME FOR SLEEP. Night is evidently the period appropriated by nature for repose, and general experience has proved, that it is the only one during which we can with certainty obtain that sound, sweet, and refreshing slumber, so necessary for the preservation of health. Sleeping during the day is, indeed, on many accounts, a pernicious practice, which should be carefully avoided, excepting under particular circumstances of disease, or when a sufficient amount of repose cannot be obtained at the natural periods. This, however, does not apply to infants. For the first months after birth, a healthy child sleeps full two-thirds of its time. This propensity requires to be indulged by day as well as by night, but, with judicious management, it may be brought, in a short time, to require and enjoy repose during the latter period only. Young children, when fatigued by exercise, will also, in general, be found inclined to sleep during the day ; from indulging them in a short repose, under such circumstances, no bad effects can result, provided their clothing be perfectly loose, so that every part of their bodies is freed from bands or ligatures.

The popular maxim, "early to bed and early to rise," is one which should be rigidly observed by every individual. It has been remarked that, in the natural state, the disposition to sleep usually comes on soon after the commencement of darkness ; and, according to the oldest and most accurate observers, three or four hours sleep before midnight is very nearly as refreshing as double that portion in the morning. Persons who spend the day in manual labor, or active exercise in the open air, with great difficulty keep awake for a few hours after the night has closed in ; and this disposition to early sleep is, perhaps, one of the strongest indications of perfect health. It has been very correctly remarked "that the atmosphere of the night is always more vitiated, and consequently less fit for respiration, than that of the day ; and as we respire a greater portion of air while awake than in a sleeping state, it follows that from these, independent of other causes, the system is more liable to injury in the former than in the latter state."

Early rising is equally important to the health of the system as early rest. On no account should any one permit himself to again slumber, after the moment of his first awaking in the morning, whether this happen at the early dawn, or before the sun has risen ; even though from accident or unavoidable causes he may not have enjoyed his six or eight hours of repose. It is much better to make up the deficiency, if necessary, at some other time, than to attempt taking

another nap. Whoever shall accustom himself thus to rise, will enjoy more undisturbed sleep during the night, and awake far more refreshed, than those who indolently slumber all the morning.

TIN. This is a white soft metal, softer than silver and harder than lead. The native oxide, is the principal ore of tin which is found in Spain, Saxony, France, the East Indies, and South America; and in Cornwall and Devonshire, whence the greatest part of the tin consumed in Europe is procured. Camden supposes the abundance in these two provinces to have given the name Britain to the whole country. In the Syriac language *varatanac* signifies land of tin, from which Bochart derives the name Britain. The principal properties of tin are, that it is very flexible, next to lead in softness, and the most fusible of all the common metals, except mercury. It is of great use for coating the inside of copper vessels for culinary purposes; but as thus it constitutes only an imperfect protection from the poisonous qualities of the copper, it is much better applied on thin sheets of iron, forming what are called tin plates, of which the tin ware, now chiefly used for the common purposes of the kitchen, is made.

TOAD. A harmless but unsightly amphibious animal; very tenacious of life, and believed when enclosed in stones and trees to be able to exist for many centuries; being torpid during the winter, they creep into crevices and sometimes become enclosed by petrification or concretions. They live on small worms and insects, and are great enemies of wasps. The *Pipa* or Surinam toad is larger than our toad and more ugly; but its young grow in cells on its back from eggs to tadpoles, and then to perfect toads in large numbers. Toads are frequently esteemed a kind of nuisance on one's premises; and, truly they are not very comely to the sight. Yet, it would be difficult to tell of any injury ever done by them. On the contrary it is affirmed that in gardens they are of great service in destroying the vermin there, oftentimes so annoying and destructive to tender plants. Some gardeners have been known to collect all the toads they can obtain to be thus employed.

TOBACCO. A plant greatly in use, which was first found among the natives of America. In the year 1534, James Cartier, a Frenchman, was commissioned to explore the coasts of North America, with a view to find a place for a colony. He observed that the natives of Canada used the leaves of an herb which they preserved in pouches made of skins, and smoked in stone pipes. It being very offensive to the French, they took none of it with them on their return. Ralph Lane, at his return in 1586, carried it first into Europe; and Sir Walter Raleigh, who was a man of gaiety and fashion, not only learned the use of it himself, but introduced it into the polite circles. It is related that a servant of Sir Walter, bringing a tankard of ale into his study as he was smoking his pipe and reading, was so alarmed at the appearance of smoke issuing out of his

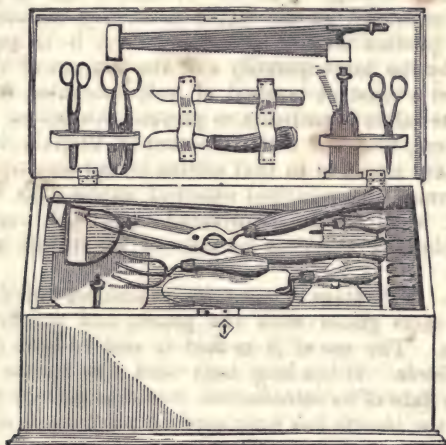
mouth, that he threw the ale into his face, and run to alarm the family, crying out that his master was on fire.

Much of the peculiarity of taste and aroma, and the consequent value of tobacco, depends on the soil, and the preparation or sweating of the plants after drying. The former should not be too rich, and never highly manured, as the flavor is thereby materially injured, although the product will be increased. Yet it is an exhausting crop, as seen by the large quantity and the analysis of the ash; and the soil requires a constant renewal of well fermented manures, and particularly the saline ingredients, to prevent exhaustion. The cultivation of tobacco, from the first settlement of Virginia, has been an object of primary attention in that section of our country; and for a long time it formed the principal object of export from Virginia and Maryland. It is still largely cultivated there, and has become an object of considerable attention in some of the middle and western States.

TOMATO. This plant or vegetable, sometimes called love apples belongs to the same genus with the potato, and was first found in South America. The use of it as food is said to have been derived from the Spaniards. It has long been used also by the French and Italians. The date of its introduction into this country is unknown. It is said that the tomato has been used in some parts of Illinois for more than fifty years. Its introduction on our tables, as a culinary vegetable, is of recent date. Thirty years ago, it was scarcely known but as an ornament to the flower garden, and for pickling. It is now cultivated in all parts of the country, and found either in a cooked or raw state on most tables. In warm climates, it is said that they are more used than in northern, and have a more agreeable taste. It is now used in various parts of the country, in soups and sauces, to which it imparts an agreeable acid flavor; and is also stewed and dressed in various ways, very much admired, and many people consider it a great luxury.

We often hear it said that a relish for the tomato is an acquired one; scarcely any person at first liking it. It has, indeed, within a few years, come into general use, and is considered a particularly healthy article. A learned medical professor in the West pronounces the tomato a very wholesome food in various ways, and advises the daily use of it. He says that it is very salutary in dyspepsia and indigestion, and is a good antidote to bilious disorders, to which persons are liable in going from a northern to a warmer climate. He recommends it also in diarrhœa, and thinks it preferable to calomel. The tomato is a tender, herbaceous plant, of rank growth, but weak, fetid, and glutinous. The leaves resemble those of the potato, but the flowers are yellow, and arranged in large divided branches. The fruit is of a light yellow, and a bright red color, pendulous, and formed like the large squash-shaped pepper. They should be planted near a

fence, or a trellis should be provided for them, in the same manner as for nasturtiums ; or they will do pretty well, if planted four feet from each other. Stakes, too, may be driven up among them, to keep them from falling. They will bear till the frost.



GARDENERS TOOL CHEST.

TOOL SHOP FOR FARMERS. Every farmer ought to possess a variety of tools, such as are needed in repairing farming implements—fences, gates, and pens ; and for doing such work generally, as will always be required on the premises, and which every person may acquire the habit of doing, although he has no mechanical trade. How often does a nail give way, and hence a board becomes loose ! If he has nails and a hammer at hand, a few minutes will be sufficient to make it secure. Whereas, if permitted to remain insecure, it may fall and be broken, so that a new one will be required to supply its place. How often will the fastenings on a gate or door demand a slight attention, to prevent destruction from the wind, as well as to keep the stock from going where they ought not. How often does a rake-tooth or an axe-handle get broken ; a hoe-handle become loose in its socket ; an ox-bow pin gets lost ; a floor plank in the stalls becomes damaged. If he has tools and materials at hand for making repairs, he may do it himself in half the time to be occupied in going after a mechanic to do it ; besides, if he does it himself, he does not have to pay another person for doing it.

To do these things, he must have hammers and hatchets, gimlets and augers, chisels and gouges, drills and screw-drivers ; saws and files, squares and compasses, pliers and pincers ; also a punch, a vice,

an adze, a drawing knife, a gauge, and, perhaps, twenty other articles, the cost of which is not much—not equal to what they will enable a person to save in a single year, if he uses them as he may do. Besides, the time generally taken in such acts would never be missed; it is fragments of leisure about the season of meals, or stormy days, when nothing else would be done. With such habits of attention to the farming implements, and to the various fixtures on the premises, whenever a job of work is to be undertaken, no delay is caused by the want of instruments to effect it. This is the secret why some farmers get along with their labor so much better than their neighbors. They do not have to wait a day before beginning any specified operation, in going after a carpenter, a wheelwright, or blacksmith, after the laborers are personally ready to engage in it.

TORNADO. A tornado seems to partake much of the nature of a whirlwind, or perhaps of a water spout, but is more violent in its effects. It commences very suddenly, several clouds being previously drawn together, when a spout of wind, proceeding from them, strikes the ground in a round spot of a few rods or perches diameter, and proceeds thus half a mile or a mile. The proneness of its descent makes it rebound from the earth, throwing such things as are movable before it, but some sideways or in a lateral direction from it. A vapor, mist, or rain, descends with it, by which the path of it is marked with wet.

TORPEDO. A fish that gives to those who touch it a kind of electric shock. The body of this fish is almost circular; the skin is soft, smooth, and of a yellowish color, marked with large annular spots; the tail tapering to a point. Such is that unaccountable power it possesses, that, the instant it is touched, it numbs not only the hand and arm, but sometimes also the whole body. The shock received most resembles the stroke of an electrical machine; sudden, tingling, and painful. Even if one treads upon it with the shoe on, it effects not only the leg, but the whole thigh upwards. The nerves are so affected, that the person struck imagines all the bones of his body, and particularly those of the limb that received the blow, are driven out of joint. All this is accompanied with an universal tremor, a sickness of the stomach, a general convulsion, and a universal suspension of the faculties of the mind.

TORRID ZONE. That portion of the earth over every part of which the sun is vertical, or perpendicular, at some time of the year. It extends from twenty-three degrees and twenty-eight minutes north latitude, to twenty-three degrees and twenty-eight minutes south. This zone comprehends the East and West Indies, the Philippine Islands, the greater part of South America and Africa, and almost all Captain Cook's discoveries, including the northern parts of New Holland. In order to prevent its being burnt up by the rays of the sun, Providence has placed in the torrid zone the largest diameter of the

South Sea, and the greatest breadth of the Atlantic Ocean ; and there it has collected the greatest quantity of islands in existence. Farther, it has planted in the breadth of the continents, the greatest bodies of running water that are in the world, all issuing from mountains of ice ; such as the Senegal and the Nile, which issue from the mountains of the moon, in Africa ; the Amazon and Orinoco, which have their sources in the Andes. Again, it is for this reason that Providence has multiplied in the torrid zone, and in its vicinity, lofty chains of mountains covered with snow, and that it directs thither the winds of the north pole and of the south pole, of which the trade winds always partake.

TORTOISE. There are many species of the sea-tortoise or turtle found in the West Indies and the South Seas, which are principally distinguished by the peculiarities of their feet. It has four legs and a tail, and the body is covered with so strong a shell, that several men may stand on it without doing it any injury. The tortoise digs round holes in the sand, in which it lays several membranaceous eggs. Some of the species, such as the common green turtle, and the hawksbill turtle, grow to a very large size, and are not unusually four, five, or six hundred pounds weight. Those who take them watch them from their nests on shore, in moonlight nights ; and before they reach the sea, turn them on their backs, and leave them till morning, for they are utterly unable to recover their former position ; at other times they hunt them in boats with a spear, striking them with it through the shell ; and as there is a cord fastened to the spear, they are taken much in the same manner as whales. Tortoises will live after being deprived of the brain, and even their heads. The flesh of many of the sea turtles is highly esteemed as food ; that of the hawksbill turtle is, however, indifferent ; this species is noticed chiefly as producing the tortoise-shell of commerce, so well known and used for various purposes.

TRANSPLANTING LARGE TREES. The writer having made several unsuccessful attempts to transplant tulip trees and make them live, resolved on the following expedient. In the autumn of 1849 he selected one standing in an open pasture, twenty-seven inches in circumference, and about twenty-five feet in height. Around the trunk, eight feet in diameter, he dug a trench fifteen inches in depth, and nearly two feet in breadth. As soon as the frost rendered the mass of earth within the trench of a solid consistence, he commenced digging underneath it at the outer edge. This gave the frost a better opportunity to operate, till it became nearly as impenetrable as a stone. This undermining of it was continued at intervals for two months, till with levers, one side was lifted up and the tap root cut off—all the lateral roots being of course imbedded in the frozen earth. It was then raised up by levers upon a sled, the whole being drawn by four oxen to the place prepared for it, an eighth of a mile, and afterwards

easily deposited therein and made to stand upright, the position in which it was transported. On the return of spring the buds expanded and the leaves unfolded themselves with as much vigor as though it had never been touched; nor has the growth to appearance been retarded.

If very large trees are transplanted, even in this manner, it is apparent that it will be a long time before their growth will become vigorous, as so great a reduction is unavoidably made in the quantity of their roots. In all cases it is ordinarily a good rule in transplanting trees to remove as many of the branches as of the roots. Between the number of the roots and branches there is a correspondence in number and size; the existence of the former is necessary for the preservation of the latter.

TRANSMIGRATION. In pagan mythology, the passing of human souls into other bodies. This doctrine originated among the East Indians, and is of great antiquity. The Indians believed that the soul transmigrated from body to body, for a long succession of ages; that the punishment of crimes would be to have the souls of the criminals thrust into some unclean or detested brute animals after death; that the cruel or tyrannical, for instance, would suffer in other bodies the same kinds of distress and tortures that they had inflicted; and that after a course of trials and transmigrations, the soul would be reunited to its original body, in order to enjoy eternal happiness. Accordingly, they scrupulously abstained from eating flesh and from spilling the blood of any of the inferior animals, lest they should eat or kill some near relation. Pythagoras, in his travels in India, learned this doctrine of the Indian Brachmans, and taught it in Greece.

TREACLE or MOLASSES. The chief difference between this article and sugar appears to be in its mucilaginous or gummy coloring matter; it is more laxative than refined sugar; and may by dilution and the addition of yeast, be made to undergo the vinous and acetous fermentations. In the first, a considerable portion of spirit may be obtained from it, flavored of course with the peculiar taste which the sugar imparts, as in rum, the taste of which arises, no doubt, from the essential oil of the sugar.

TREADMILL. An instrument of punishment, lately introduced into England and this country, consisting of a large wheel, about twenty or twenty-five feet wide, with steps on its external surface, upon which the criminals are placed. Their weight sets the wheel in motion, and they maintain themselves in an upright posture by means of a horizontal bar fixed above them, of which they keep hold. The power thus obtained may be applied to the same purpose as water power or steam. The exercise is very fatiguing, and the prisoners are relieved every eight or ten minutes.

TRIANGLE. In Geometry, a figure of three sides and three angles. Triangles are either plane or spherical. A plane triangle is

one contained by three right lines ; and a spherical triangle is one contained by three arcs of great circles of the sphere. Triangles are denominated, from their angles, right, obtuse, and acute. A right-angled triangle is that which has one right angle ; an obtuse-angled triangle is such as has one obtuse angle ; and an acute-angled triangle is that which has all its angles acute. The triangle is the most important figure in geometry ; and its various lines bear the most interesting relations to each other.

TREES. Few objects can be more innocently pleasing and of more importance in the economy of nature, and to man, than the various vegetable productions of the earth. The large proportion which its surface bears to its herbage and the immense extent of the forests in comparison with that of meadows, pastures, prairies, or plains, seem to indicate that trees and shrubs act an important part in the economy of our globe. In countries uninhabited by man, the influence of forests must be great on the climate, on the soil, and on the number of wild animals, and on the herbaceous vegetables. In civilized countries, to those influences must be added the relation in which they stand to man.

It appears highly probable, that the greater part of the surface of our globe has been, at one time, covered with wood ; because among other reasons, coal is found in nearly all countries in both hemispheres, from the equator to the poles ; at all events, it is certain that this has been the case with the greater part of the temperate regions of the globe at no very distant period. The whole of the American continent was, until lately, we are led to presume, almost entirely covered with trees and shrubs, and presented few naked surfaces, except those of the prairies, alluvial deposits on the banks of its large rivers, and on the tops of the highest mountains ; and what was so recently the condition of America must, we have reason to suppose, once, at least, have been that of every other part of the whole world.

The influence which a predominance of forest must have in a country uninhabited by man, must have extended to the animals, the herbaceous vegetables, the soil, the waters, and the climate. To wild animals of every kind, especially to those of the more ferocious tribes, forests have, in all countries, furnished shelter, and in a great measure, food ; birds, insects and reptiles are the more common inhabitants. Herbaceous plants are, for the most part, destroyed by dense forests ; but some kinds are encouraged by the thickness of the shade, and the moist heat which prevails among the trunks and the branches of trees. But the great influence of forest scenery in a wild state, is on the soil ; and in this point of view, natural forests may be regarded as a provision of nature for preparing the surface of the earth for the cultivation of the chief productions which constitute the food of man, and of domestic animals. It would be interesting to show how the soil is furnished with the organized matter, so essential to the growth

of perfect plants, by the decay of leaves, and, ultimately by the decay of trunks and branches. The water of a country, the rivers and lakes, are invariably affected by the state of the woods of that country. These woods, and their mossy beds, must, in all cases, act more or less as sponge in retaining the water which falls on them; and water must thus be supplied more gradually to the rivers, in countries covered with wood, than in those which are cleared and regularly drained.

TROUT. A delicate fish, abounding in the rivers and ponds of England, and weighing from four to twenty-five pounds. They weigh less in the United States. It has a short roundish head, and wide mouth, filled with teeth, which cover the palate and tongue, the scales are small, the back ash-colored, the sides yellowish, and, when in season, it is sprinkled all over the body with small, beautiful red and black spots. These fish abound in small brooks and ponds; anglers use worms or artificial flies as baits to take them.

TRUMPETER. A South American bird, about as large as a domestic fowl, referred by naturalists to the waders, of which it has the long neck and legs; but it possesses many characters in common with gallinaceous birds. The feathers of the throat and the upper part of the breast have the most brilliant reflections of green, gold, blue, and violet; the other parts of the body are black, except the middle of the back and lesser coverts, which are reddish, and the greater coverts of the wings and tail, which are ash-colored. In the wild state this bird is found only in the mountainous and woody districts of the hottest parts of South America, where it lives on fruits. It runs swiftly, sometimes walks with a slow pace, or leaps. Its wings and tail are very short, and its flight clumsy. The name has been applied on account of the note which it utters. It is easily tamed, and shows as much attachment and fidelity to its master as a dog. It obeys his voice, caresses and follows him, and recognises him after a long absence. It drives away all strange animals, and fears neither cat nor dog. Those which live in the streets of Cayenne will often attach themselves to a stranger, and follow him wherever he goes. In short, these birds are superior to all others in intelligence and social disposition; and it would be desirable to naturalize them in our climate,—an experiment which has never been fairly tried, that we are aware of. It is said that flocks of sheep are confided to their charge, and that they constantly bring them home every evening. It is certain that the care of poultry may be safely entrusted to them.

TUNNEL. This term, in civil engineering, denotes an arched passage formed under ground to conduct a canal or road on a lower level than the natural surface. Long tunnels are usually made through hills, to avoid the inconvenience and loss of power occasioned by conducting a canal, road, or railway over elevated ground, and also the enormous expense of such an open excavation as would be

necessary in order to preserve the requisite level. The most extraordinary work in tunneling of antiquity was under the bed of the Rhone, below Avignon, undertaken by the Romans. A more splendid one, however, has been made under the Thames, to connect the portions of London on the opposite sides of this river.

The Thames Tunnel was projected about the year 1825. The enterprise required a long preparation. The excavation of the tunnel was commenced in January, 1826, in a stratum of clay; but several interruptions of the river took place; and the one in 1828 was so serious in its consequences, that the company did not resume operations till 1835. The tunnel is twelve hundred feet in length, between the two shafts on the opposite banks of the river. It was not till 1843 that this tunnel was opened for foot passengers. But although it was one of the grandest undertakings in the history of human enterprise, in a commercial point it has by no means equaled the anticipations of its projectors. It is truly a great curiosity of art, and will remain so as long as its massive abutments and arches retain their present firm position, which may be to the end of time; but, even as such it does not attract that observation and admiration from the multitudes of foreigners visiting that proud metropolis, which might be supposed.

TURKEY. The turkey, for the table, is an universally favorite bird. The finest and strongest are those of a bronzed black, as closely as possible resembling the original stock, which is the wild turkey. These are not only reared the most easily, but are generally the largest, and fatten the most rapidly. Some turkeys are of a coppery tint, some of delicate fawn color, while others are parti-colored, grey, and white, and rarely they can be found of a pure snow white. All of the latter are regarded as inferior to the black, their color indicating something like degeneracy of constitution, if not actual disease. Some have considered the turkey a most profitable bird, inasmuch as it will provide for itself almost wholly, if permitted to run at large during the season when snails, slugs, worms, and grasshoppers are abundant. These, to the turkey, are a great luxury, and the young birds, after two months old, will grow on them better than any other food. The refuse meat from the slaughter house, chopped up fine, is excellent food for them. However, they will sometimes, unless furnished with yards, (the larger the better,) from which they cannot escape, be very troublesome to the farmer. They will destroy double the grain they want to eat by treading it down; and in locations to which they have access, it is impossible to raise cabbage.

Notwithstanding turkeys are apt to provide feed for themselves, they should be fed at least in the morning, as it will tend to attach them to their home, and prevent them from wandering so far from it, as they would do if not thus fed. They will roost out on trees during the whole winter, but as their feet are tender, they will be likely to

freeze, should the weather be extremely cold. They should, therefore, be furnished with warm and comfortable shelters, and they should never be suffered to become poor from want of sufficient feed. In Browne's Treatise on Poultry, will be found ample directions for the rearing of turkeys. The work is called the American Poultry Yard.



TURKEY.

TURNIPS. Little is known of the history of this valuable plant. Its origin appears to be uncertain, but the choicest English varieties, from which our own are descended, were brought from Hanover. For culinary purposes, it has been prized from the earliest periods, long before it was considered important in an agricultural point of view. Cumella recommends its extensive cultivation, because that portion of the crop not wanted for the table will be greedily eaten by the farm

cattle. At the present day, however, its merits are generally acknowledged, and in some countries it occupies a conspicuous position in every system of husbandry. It must be yet fresh in our minds, how, in the recent dearth in Ireland, the people placed their whole trust upon the success of the turnip crop.

It has been remarked, that the turnip culture effected a great and beneficial revolution in English husbandry, as the introduction of the steam engine and spinning jenny effected in British manufactures. This crop has there proved a great source of wealth and fertility. It constitutes by far the greatest material for making beef and mutton, as well as for enriching or keeping up the fertility of the soil. In our own country, the turnip culture has not received the attention its importance demands. Those who have made sufficient experiments to testify in regard to its value, speak well of it. Six hundred bushels to the acre is a fair crop of the Swedish turnip. Some raise double that quantity.

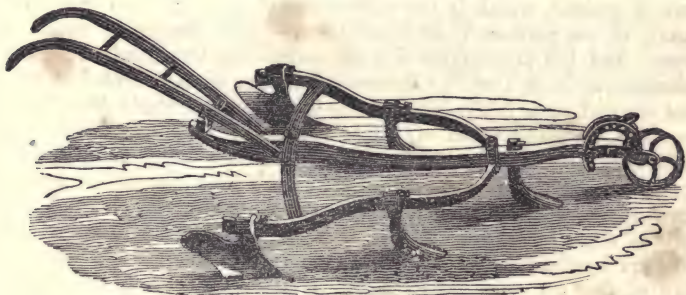
TURPENTINE. A resin, flowing either naturally, or in consequence of incision, from various sorts of trees ; as the terebinthus, larch, pine, and fir. In medicine, the uses of turpentine are innumerable. Among many other good offices, it cures wounds, cleanses ulcers, and relieves the lungs. The distilled oil or spirit of turpentine, is also a useful medicine, and, besides, is of great service in various arts.

TWILIGHT, or CREPUSCULUM. The time from the first dawn of the morning to the rising of the sun ; and again, between the setting of this luminary, and the last remains of day. It is usually computed to commence and terminate when the sun is about eighteen degrees below the horizon. Without this twilight, the sun's light would appear at its rising, and disappear at its setting, instantaneously ; and we should experience a sudden transition from the brightest sunshine to the profoundest obscurity. The duration of twilight is different, in different climates ; and in the same place, it varies at different periods of the year.

ULMIN. A substance obtained from the elm tree, of very singular properties. It resembles gum, but is hard, of a black color, and considerably bitter. In its original state, it is soluble in water, and insoluble in alcohol or ether ; but when nitric or oxymuriatic acid is poured into its solution, it changes into a resinous substance no longer soluble in water, but soluble in alcohol.

UNIVERSAL CULTIVATOR. The Cultivator is a great labor-saving implement, for stirring the earth between the rows of corn and other crops. There are several patterns. What is called the Universal Cultivator, is of recent construction, is longer than those previously used, and entirely of iron, except the centre beam and handles. The side beams are of wrought iron, and so curved that they are expanded or contracted, by loosening the iron key that confines the teeth in their place. They are each moved forward or back, to a

point that will again cause them to work parallel with the centre beam, and at equal distances from each other. To these are fitted several sets of different teeth and scarifiers of wrought and cast iron. There is also one pair of teeth calculated to work in the rear, formed like small plough shares, turning the furrows in opposite directions. They can be so placed as to turn the furrows to or from the rows of vegetables. If the forward teeth are used at the same time, both together finely pulverise the soil. The cultivator is made to expand from two to five feet. A man and a horse will do the labor of half a dozen men in a cornfield, and far better than it can be done with a hoe.



UNIVERSAL CULTIVATOR.

URINE. This is the fluid excrement of animals, and is produced by the action of the kidneys on the blood. In birds and reptiles, the substances composing the urine are solid, and are voided in their dung. All urine contains the essential elements of vegetables in a state of solution; but the various species of urine from different animals, differ in their constituents; and the urine from the same animal alters when any material change is made in its food, as well as when there is an increased flow of milk. For instance, a cow in milk, when fed on rich food, yields less urine than one which is dry; and the urine varies in quantity in proportion to the amount of milk she gives. The efficacy of it as a fertilizer, depends upon the quantity of solid matter which it holds in solution, upon the nature of said matter, and especially upon the rapid changes which the organic part of it is known to undergo.

As little attention as has generally been paid to the saving of urine, it is one of the most valuable of all manures. That of the cow and hog is said to be more valuable, because it contains more solid soluble matter than that of any other domestic animal. The efficacy of urine as a manure, is owing to the large amount of urea, ammonia, and phosphates, and consequently of nitrogen, which it contains. Recent urine generally exerts an unfavorable influence on vegetation; it is

most beneficially applied after fermentation has fairly commenced, and before it reaches the final state of the process, decomposition is attended with a diminution of urea and an increase of ammonia. It is important that it should be collected and fermented in tightly covered cisterns to prevent the escape of volatile matters; and it has been proposed to add gypsum, sulphate of iron, or sulphuric acid, to the fermenting urine, in order to fix the ammonia; the mixture of vegetable mould with it, has also been recommended as equally effective and more economical. The loss of manure in waste urine, in densely populated countries and large cities, is immense.

If every human being voids annually enough urine to manure an acre of ground, which is the calculation of scientific farmers, then a family of ten persons, if so minded, could save enough to enrich ten acres; and, the inhabitants of a city containing five hundred thousand inhabitants, New York, for instance, if means were provided to collect and convert their liquid evacuations into manure, would fertilize five hundred thousand acres of land; which, if well cultivated, would yield vegetable food double the amount of their own consumption of it; and enough, also, to rear and fatten the farm animals required for their nourishment. The same estimate may be made of the inhabitants of other localities. Again, it is calculated that each man will void six hundred pounds of urine in a year. But we will call it one half of that for each individual in a family, so that if the family is composed of ten persons, the urine voided by the whole in a year, will be three thousand pounds. This, at one cent a pound, (much less than the cost of guano,) will amount to thirty dollars; so that if it were saved, and applied as a manure, would save annually to the family doing it, thirty dollars, now ordinarily lost. At this rate, there might be an annual saving in this article, from a city like New York, of one million and five hundred thousand dollars.

URSUS. The bear, a genus of animals of ten species, which include the brown bear, a solitary animal, which lives on vegetables and fish; the American bear, which climbs trees; the Polar bear, twelve feet long, white, with shaggy hair, and very courageous when attacked, or in attacking boats and ships; the glutton, so called from its voracity; the raccoon; and the badger, about two feet long, living under ground on roots, fruit, frogs, and insects, and quite inoffensive, but often destroyed amidst circumstances of great cruelty.

VALERIAN. The root of this plant has been long extolled as an efficacious remedy in epilepsy, which caused it to be exhibited in a variety of other complaints termed nervous, in which it has been found highly serviceable. It is also in very general use, as an antispasmodic, and is exhibited in convulsive hysterical diseases. A simple and volatile tincture is prepared from it, for which directions are given in medical books.

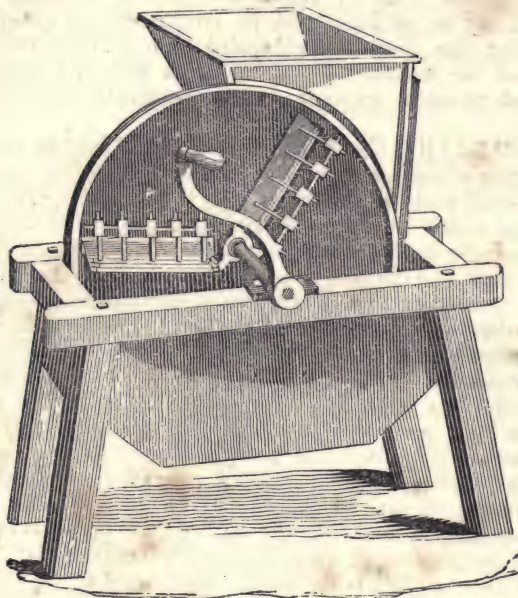
VANILLA. An exotic, parasitical plant, growing in Mexico;

whence its long slender pods, containing numerous black grains, are imported. These seeds are warm and aromatic, possessing an oily taste and a fragrant odor, similar to that of the Peruvian balsam. They are used chiefly for imparting an agreeable flavor to chocolate, in the proportion of one grain to an ounce. The drug itself is said to be resolvent and corroborant; to afford relief in flatulency; and to promote the digestion of the oily matter contained in the cacao. On the other hand, if it be too freely used, its narcotic effects, though exhilating at first, like opium, are succeeded by uncommon debility, and relaxation of the nerves. When the fresh pods are opened, they exhale such powerful fragrance, as to intoxicate the person thus employed.

VAPOR BATH. The vapor or steam bath may be regarded as a modification of the hot bath; but its effects are much less violent. The most usual mode of employing it is to expose the naked body in a room, into which the steam of hot water may be admitted. The room is generally heated to a temperature considerably above that of the atmosphere, and the body is suffered to remain for some time in the heated air, the common effect of which is, to increase its temperature, and to accelerate the circulation of the blood. After some time, the steam is admitted, when the former symptoms are removed, and a profuse perspiration is produced. This is usually promoted by friction, and a removal to a warm bed. The general effect of this process is to relax the body, to remove obstructions of the skin, alleviate pain and spasmodic contractions, and promote sleep. In the vapor bath, the stimulant power of heat is modified and tempered by the moisture diffused through the air; and, as the elastic vapor, like air, is a less powerful conductor of heat than the watery fluid, the effect of vapor in raising the temperature of the body is much less than that of the hot bath. Its heating effect is also further diminished by the copious perspiration that ensues; so that, on all accounts, the vapor bath is safer, and, in most cases, more effectual than the hot water bath.

VEGETABLE. A vegetable is composed of a root, stem, leaves, flowers, fruits and seeds; and when all these different parts are fully developed, the vegetable is said to be perfect. The root is that part of the plant which is concealed in the earth, and which serves to convey nourishment to the whole plant. The stem, which commences at the termination of the root, supports all the other parts of the plant. When the stem is large and solid, as in trees, it is denominated the trunk, which is divided into the wood and the bark. The bark constitutes the outermost part of the tree, and covers the whole of the plant from the extremity of the roots to the termination of the branches. The bark is composed of three parts, namely, the epidermis, the parenchyma, and the cortical layers. The wood immediately under the bark, is composed of concentric layers, which increase with the age of the plant. The wood next the bark, which is softer

and whiter, is called the alburnum. In the middle of the stem is the pith, which is a soft and spongy substance composed of cells. In old wood this part entirely disappears, and its place is supplied by the perfect wood. To the vegetable also belong leaves, flowers, and fruit or seeds, each of which furnishes matter for study, on account of their beauty and utility in vegetable economy.



VEGETABLE CUTTER:

VEGETABLE CUTTER. To farmers who raise turnips, carrots, parsnips, beets or potatoes for farm animals it is, as it were, indispensable to have what is called a vegetable cutter. Those which are large cannot be eaten unless they are cut; and, those which are small should also be cut—unless they are, especially potatoes and flat turnips, cattle and sheep are liable to be choked in eating them. To cut them by hand with a common knife is a work of great labor. Suppose a thousand bushels only were to be fed out in a winter, any one can tell how long a time it would take a man to cut them. If he were to cut thirty bushels in a day, which would be three bushels in an hour, it would occupy him nearly six weeks. To board a man this time, if no wages were paid, would be worth what it would cost to purchase a good cutting machine. The Cutting Machine of Ruggles, Nourse, and Mason, will prepare sixty bushels in an hour. The

cutting wheel is made of cast iron, faced on one side, through which are inserted three knives like plane-irons. These cut the vegetables into thin slices with great rapidity, and then by cross knives they are cut into slips of convenient form and size for cattle or sheep to eat, without danger of choking. The pieces after cutting lie loosely and angularly thrown together, and can be easily taken up by the animal.

VEGETABLE HABIT. Plants, like men, are much under the power of habit. The following examples are sufficient to evince the extent of this power. Several plants which are natives of warm climates, where their existence is prolonged for several successive years, have been removed to less temperate regions. They are unable to endure the cold of their new situations, and consequently must change their habits of growth ere they can be cultivated with success. To secure this object some of them pass through the successive stages of their existence with astonishing velocity, and accomplish in a single summer what they had been accustomed to require years to perform. Our garden Nasturtion was originally a shrub which flourishes without cultivation on the banks of the Peruvian streams; yet, transferred to this country, it has become an annual plant, which arrives at maturity in a few short months.

The habits of other tender plants are with more difficulty subdued, and they to be successfully cultivated must be gradually transferred from their native soil. In the latter case the habit and the power they acquire to accommodate themselves to their new situation, overcome the natural impediments to their growth, which under different circumstances would have been irresistible. Therefore it is, that plants whose seeds were ripened in northern latitudes, are less liable to injury from frost, than they would have been if their seeds had been brought from a temperate climate. By thus gradually accustoming it to a diminution of temperature, rice was at one time cultivated with advantage in New Jersey, though without these precautions it rarely comes to maturity even in Virginia. The habits of the Indian corn aided by climate and culture have suffered still more remarkable changes. After having been for several years raised in Canada, it arrives at perfection in a few weeks, and on that account is employed by us as an early corn. But that which has been repeatedly cultivated in Virginia will not ripen even in New England, yet originally the small early Canadian, and the luxuriant Virginia corn were the same, both in habit and in every known property. They probably originated from the same identical seed. Numerous other examples might be mentioned, but enough has been done to justify the conclusion, that vegetables as well as animals are under the dominion of habit.

VEGETABLE INSTINCT. A little attention to the subject of physiology will satisfy us that plants have a most curious kind of instinct or sensibility, as it is sometimes called. Their roots will

take a direction to the place where moisture or other aliment exists, for their nourishment. Plants will distinguish between heat and cold, darkness and light, and the other sensible properties of the atmosphere which promote, from those which retard vegetation, with unerring certainty. Thus when plants are placed by our windows, we see them present the upper surface of their leaves to the light ; and when their position is reversed, a new arrangement of the leaves takes place, by which the same surface is again exposed to the rays of the sun. Some flowers which shine with distinguished lustre in the morning, shrink from the dazzling brightness of the noonday sun ; some court his meridian glory, while others at the approach of darkness, expand their tender blossoms, loading with perfume the breezes of evening. Thus too, we find the leaves of some plants closing around their tender blossoms, to protect them from the injurious effects of cold and moisture ; and others exquisitely sensible to the touch of extraneous bodies. The flowers of the barberry, a shrub, which grows abundantly in our country, evince a susceptibility of impression from external objects, at once curious and surprising. The leaves of the sensitive plant, so often the innocent source of interest and amusement, exhibit the same phenomena in a still more remarkable degree.

VELVET. A rich kind of thick, shaggy stuff made of silk ; the nap, or velveting, of this stuff is formed of part of the threads of the warp, which the workman puts on a long narrow channelled ruler, and which he afterwards cuts by drawing a sharp steel tool along the ruler to the end of the warp. The principal and best manufactures of velvet are in England and France ; there are others in Italy, as at Venice, Milan, Florence, Genoa, and Lucca, and in Holland at Haerlem ; those in China are the worst of all. A good imitation of silk velvet is now to be obtained, made of cotton ; but the dyes are less permanent on cotton than on silk.

VENTILATION. It is much to be regretted, that in connexion with the various improvements, which the style of building, and the internal arrangement of our houses, have undergone within the last ten years, more attention has not been paid to the means for insuring a free ventilation throughout every apartment. In the large and sumptuous dwellings of the rich, the wide halls, lofty ceilings, and free communication existing between the principal apartments, prevent, it is true, most of the causes of complaint in this respect ; but in the more numerous and humble dwellings, occupied by the laborer, as well as by the industrious mechanic and artisan, and in the buildings, appropriated for workshops, stores, and warehouses, the means of ventilation, have in too many cases been sadly neglected. As a necessary consequence, cleanliness is prevented, and the health and comfort of the inhabitants and inmates prejudiced to a greater or less extent. A free circulation of air, in and about a building, is of too much importance, to allow of its being sacrificed from motives of economy

avarice or mere convenience. Air, when it is confined for any time within a room, or rendered stagnant by any other means, soon becomes, not only unfitted for respiration, but absolutely destructive to life.

Under such circumstances, its composition is quickly changed from various causes; while at the same time, it is loaded with dust and deleterious exhalations given out by the human body, even in health, or produced from the decomposition of animal or vegetable substances. Every one who has entered a room, that has been completely shut up for even a few days, whether inhabited or not, must have been struck with the peculiar smell of the air in it, and experienced the disagreeable sensation, caused by its admission into the lungs. The walls and furniture are soon covered with a damp mould, every thing within the apartment of a perishable nature, falls quickly into decay, and affords materials for the still further vitiation of the atmosphere. Many complain of the unpleasant smell and dampness of their houses, without suspecting for a moment that this is merely the result of defective ventilation.

It is all important, therefore, that the air from without should be allowed to enter freely into every part of a building, if not in a continued current, at least at frequent intervals, so as fully to expel that previously existing in the several apartments. The causes of deficient ventilation are either, the location of the building in narrow crowded courts or alleys—the want of a free communication between the different rooms, in each story—the improper position of the doors and windows, or, the want of an open space of sufficient extent in the rear of the house, in consequence of which the free circulation of the air, is entirely prevented. The healthiness of a dwelling is increased very considerably by allowing to it a capacious yard, which may either be well paved, laid down in grass, or cultivated as a flower garden. In the largest and best constructed houses, ventilation should be promoted, by leaving the doors and windows open several hours, during the day, in fair weather and when the air is driest, and closing them carefully before nightfall. Even in winter, a proper opportunity should be taken, during the day, to admit freely the external air in every apartment of the house, especially the bedrooms; the ventilation of workshops and manufactories, can be maintained by proper furnaces, which, while they supply a current of heated air, for warming the apartment, cause its atmosphere to be constantly renewed.

VETERINARY. The art of managing cattle, and curing their diseases, whence a veterinary surgeon, vulgarly called a horse doctor or farrier, and the veterinary college, where horses are taken in for cure, and persons resort to acquire practice and information in all that relates to the care of animals. The principal diseases to which horses are subject are the water farcy, or dropsy of the skin; ascites, or

dropsy of the belly ; broken wind, supposed to arise from a rupture of the cells in the lungs ; cracks in the heels, from gross habit or from filth ; farcy, an infection of the skin ; foot-foudering, when a horse is unable to rest on any of his feet ; greasy heels, from weakness or overlabor ; lampers, a swelling of the bars in the roof of the mouth ; mange, an affection of the skin, when the hair falls off ; staggers, a sort of lethargy, and mad staggers, a sort of frenzy from a pressure on the brain ; strangles, a disease attended with a fever, cough, and running at the nose ; thrush, a discharge from the frog of the foot ; pole evil, arising from friction of the collar at the back of the ears ; besides inflammations, fevers, dysenteries, and other disorders which they have in common with human subjects. It is desirable, that every farmer and every person owning or having the care of horses and cattle should have an elaborate treatise on the diseases and the treatment of these animals. We recommend for this purpose Randall's edition of Youatt on the Horse, and Stevens' edition of Youatt and Martin on Cattle. As valuable as these works originally were, the editors have greatly added to their merits. Oftentimes by having such a work at hand, and by timely reference to it, the life and usefulness of a superior animal may be preserved to its owner.

VITRIOL. A salt, of a very caustic taste. It is a sulphate generally found in mines in a capillary state, or in a loose powdery efflorescence. The three principal sorts are the green vitriol, copperas, or sulphate of iron ; the blue vitriol, or sulphate of copper ; and the white vitriol, or sulphate of zinc.

VINE. Of all the productions of the vegetable world which the skill and ingenuity of man have rendered conducive to his comfort, and to the enlargement of the sphere of his enjoyments, and the increase of his pleasurable gratifications, the grape-vine stands forward as pre-eminently conspicuous. Its quickness of growth, the great age to which it will live, sometimes to an unknown age, its almost total exemption from all those adverse circumstances which blight and diminish the produce of other fruit-bearing trees, its astonishing vegetative powers, its wonderful fertility, and, especially, its delicious fruit, applicable to so many purposes, and agreeable to all palates, in all its varied shapes, combine to mark it out as one of the greatest blessings bestowed by Providence to promote the comfort and enjoyments of the human race. The native country of the vine is generally considered to be Persia, but it has been found wild in our own country, and is now become naturalized in all the temperate regions of the world.

From the remotest records of antiquity, the vine has been celebrated in all ages as the type of plenty, and the symbol of happiness. The pages of Scripture abound with allusions to the fertility of the vine as emblematical of prosperity ; and it is emphatically declared, in describing the peaceful and flourishing state of the kingdom of

Israel during the reign of Solomon, that Judah and Israel dwelt safely, every man under his vine and under his fig-tree, from Dan even to Beersheba. The vine is supposed to have been introduced into Britain at the commencement of the Christian era ; and history amply proves that for a long series of years, vineyards were very common in the southern parts of that island, and that the quantity of wine produced from them was so great as to be considered one of the staple products of the land. The culture of the vine in our country is increasing ; but only in a few places has it yet become a source of profit for wine. When the facility and ease with which it can be made a source of pecuniary gain is better understood, its culture will be greatly extended, there is no doubt ; for we have soil and climate in abundance adapted to its growth.



VULTURE.

VULTURE. The vulture here represented in the cut is larger than an eagle, and possesses amazing strength. Its head and neck are without feathers, and are covered only with a very slight down or a few scattered hairs. The vulture is deficient in all the nobler qualities of the eagle ; and rivals it only in size, strength, and rapacity. This bird is cruel, unclean, and indolent ; and its very appearance is filthy and disgusting. In Egypt, vultures are usually seen in company with wild dogs of the country, tearing a carcass with the utmost deliberation and apparent good will to each other. This singular association is the more remarkable, as both are extremely rapacious,

and both very lean, probably having but a scanty supply even of the wretched food on which they subsist. Here they are of singular service. In the neighborhood of Grand Cairo are great flocks of them, which no person is allowed to kill, as they devour all the carrion and filth of that large city, that would otherwise tend to corrupt and putrefy the air.

VINEGAR. In our own country cider is the principal material from which vinegar is made. The common method of making it in the family is this; a vinegar-barrel, so called, is placed in the garret, or on the sunny side of the house, during the summer, and during the cold weather, in a room where it does not freeze. The refuse cider, already sour, or the daily remnants of the table where cider is used upon it, are added to some good vinegar in the barrel, or to the mother of vinegar, the common name of a thick film which collects on this liquid. The good vinegar, or the mother, will act upon the liquid substances thus added to it, till the whole becomes acidified, and thus formed into the article desired. In wine countries it is usually made from the poor wines; and wherever wine has become soured, it may be, and frequently is, converted into vinegar. This liquid has been known from the earliest times, both as an article of commerce, in domestic economy, and when diluted in water as a beverage by laborers and soldiers. The ordinary uses of it are too well known to require specification.

WAFERS. For sealing letters, are made by mixing fine flour with the whites of eggs, isinglass, and a little yeast, and beating the mass into a paste; then spreading it, when thinned with gum-water, on even tin plates, drying it in a stove, and cutting it for use. The different colors may be given it by tinging the paste with brazil or vermillion, for red; indigo, for blue; saffron, turmeric, or gamboge, for yellow, &c.

WAGONS. Most probably originated from rude vehicles dragged on cylindrical logs, which must soon have suggested the idea of the axis and solid wheel, even now used in Portugal by the peasants. According to Moses, Egypt was the country where wagons were first used. The Chinese called the inventor Hiene-Huene. The Greeks attributed the invention to Erichthonius, fourth king of Athens, and say that he used them in consequence of lameness. Wagons with two wheels may have been the first constructed; but Homer mentions four-wheeled wagons, the invention of which was ascribed to the Phrygians. Whoever first conceived the idea of an axis was a most ingenious man; and he who applied it to wheels and wagons has become one of the greatest benefactors of mankind. Much time elapsed before wagons were used for pleasure carriages. The sedan chair and horseback were long preferred. In war, use was sooner made of the wagon. Moses mentions the war-chariots of Pharaoh. Theseus is said to have introduced chariots among the Greeks. The

horses were covered with iron scales. At the ends of the pole, lances were fastened, and at the sides and below were scythes. These chariots were driven into the ranks of the enemy. The Greeks, besides, used two-wheeled chariots, each containing two persons, one of whom drove, while the other threw spears. The chariots were open behind and had low wheels. The Romans used them early. From the time of Roger Bacon (in the thirteenth century) to our days, many trials of locomotive wagons have been made, of which the steam wagon, lately brought to such perfection, is the most important. The wind has also been frequently used to propel wagons. Simon Stevin, of Bruges, invented a sailing wagon for twenty-eight persons, which, on even ground, is said to have travelled fourteen Dutch leagues in two hours ! Mr. Slater, an Englishman, travelled in a sailing wagon from Alexandria to Bassora.

Where wagons are used for husbandry, they should be wide and low. Manures may be carried in this sort of wagon almost as well as in carts. Broad wheels are improper for passing and repassing upon tillage lands ; for, if in fallow, they press the land too much, and make it so hard as to prevent its being ploughed till rain comes ; but on grass lands broad wheels are proper for all uses, as they operate as rollers. Wagons are probably the best conveyances for heavy loads of every kind to a distance ; but for home business, especially harvest and other work, which requires to be speedily performed in the field, carts, it is believed, will generally be found preferable. It is important that wagons, whether for husbandry or on the highway, should be as light as consistent with strength and durability. To this end they should be made of the best materials, and with the best workmanship. Where two or three hundred pounds are thus saved in weight, it is apparent that so much additional can be transported at each load. Wagons, like all other farm implements, when not in use should be under cover ; and if well painted every year, it would be economy.

WALNUT TREE. A valuable tree, which, in its several varieties, is a native of the United States of America. The walnut is valuable for fuel, for timber and for fruit. Black walnut has been often employed in the manufacture of household furniture ; but being very brittle, it is at present partly superceded by mahogany and other foreign timber. Nevertheless it is still highly prized by joiners and cabinet-makers, for tables, gun-stocks, and other light articles ; as it is beautifully veined, and admits of a fine polish. The black walnut is also used in ship-joinery, in carriage-making, and for the interior of churches. The fruit of the walnut tree is used at two periods of its growth, namely, when green, for pickling, and in a ripe state, at the dessert. According to Bartram, the Creek Indians store up the shell bark hickory or walnuts, sometimes to the amount of an hundred bushels to a family. They pound them to pieces, and then cast them

into boiling water ; which, after passing through fine strainers, preserves the most oily part of the liquid ; this they call by a name which signifies hickory milk. It is as sweet and rich as fresh cream, and is an ingredient in most of their cookery, especially hominy and corn cakes.

WALRUS. A marine quadruped, resembling the seal in the structure of the feet, but differing in the teeth and digestive system. It is large and unwieldy, sometimes attaining the weight of two thousand pounds, and inhabits unfrequented coasts in the Arctic seas. The head is oval, short, small, and flat in front ; the flat portion of the face is set with very strong bristles, which are pellucid, about a span in length, and twisted ; the orifices of the ears are very small, but the sense of smelling seems to be exceedingly acute ; the incisors are four in the upper jaw, but the two middle ones are shed as the animal advances in age ; the upper canines are large, elephant-like tusks, directed downwards ; the feet are very short, and the toes are connected by a membrane, and armed with strong nails ; the tail is short. Formerly, vast herds of these animals frequented the shores of the islands between Northern Asia and America, Davis's Straits, and Hudson's Bay, in latitude sixty-two degrees, and even as far south as the Magdalen Islands, in the gulf of St. Lawrence, between latitude forty-seven and forty-eight degrees ; but at present, the walrus is nowhere numerous, except on the icy shores of Spitzbergen and the remotest northern coasts of America. Voyages were once made to procure its tusks and oil, and it is said that 1200 or 1500 individuals have been sometimes killed at once out of a herd.

The walrus is slow and clumsy while on land, but quick and active in the water. It often comes on shore, and the female brings forth her young there in the spring. It is fearless and inoffensive, unless disturbed, and strongly attached to its mate and young, but becomes fierce and formidable when attacked, especially if the young are present, furiously endeavoring to sink the boats by rising and hooking their tusks over their sides ; and frequently the violence of its blows is sufficient to stave the planks of small boats. Its principal food, it is said, consists of shell-fish. The tusks grow to the length of ten or twenty inches, or sometimes even three feet, weighing from five to ten pounds. They are worked like ivory, but turn yellow in a short time. The skin is about an inch in thickness, and is used for a variety of purposes.

WASHING or BATHING. This operation, so essential to good health, is so little practised in winter, that the very naming of the subject will send a thrill through the sensitive frame of many of our readers, and they will draw their garments close around them, and move nearer the fire, to save them from taking cold while reading this article. There is but little trouble in bathing in hot weather, when the application of cold water to the system is often grateful.

But in cold weather, there is in most minds a dread of water, almost as great as in one afflicted with the hydrophobia, and bathing and washing in winter, are generally discontinued ; and this is one cause of colds at this inclement season.

In summer the skin is soft and moist, and by profuse perspiration, and the frequent change of garments, the system is cleansed, in some measure, without washing ; yet washing is necessary. But in winter, the perspirable matter passes out to the surface of the body, where it lodges, forming a dry scurf, closing the pores of the skin, and perspiration after a while becomes impeded, and the redundant matter is thrown inward upon the lungs, and must be thrown off by coughing ; thus requiring a double office of these delicate organs, which have enough to do in their own peculiar province, in climates where the thermometer often varies in twenty-four hours as many degrees.

Infants are generally washed daily, but when they become large children and adults, they often go six months without this operation, so essential to health and comfort. The face is washed often, the body seldom. Why this difference ? A thorough washing of the whole system once a week, is not a hard task, and the advantages from it will be great. It will not only add to health and happiness, but to life itself. If one thinks he has not time, let him take the time from the hours of sleep, even if he be already limited in that respect to five or six hours in the twenty-four. He will sleep faster, after bathing, and make up for the deficiency. After bathing or washing in cold water, brisk rubbing with a coarse cloth will produce a pleasant glow, and prevent injury to a person of delicate constitution. But those who choose can use warm water in a warm room. We say to our readers, as you value health, life, and happiness, give due attention to thorough and frequent bathing and washing. See that every member of the family attends to it, at least once a month ; once a week is better. There is no excuse for the gross neglect on this subject, for if any one has not a bath, or shower-bath, a tub is sufficient ; and any one who has six hours to sleep, can take half an hour for bathing, and then he will gain an hour in sweeter, sounder sleep.

WATCH. In Mechanics, a machine which shows the parts of time, and may be carried in the pocket. The invention of the spring, which answers to the pendulum of a clock, and without which a time-keeper for the pocket cannot be made, is attributed both to Hooke and to Huygens. Among the first watches, according to the modern acceptance of the name, that were made in England, was that presented to Charles II.

The business of watch-making, like most kinds of mechanism, is now carried to great perfection ; and the pocket watch in its early use was so expensive that few only could be furnished with it. But they are now made with so much expedition, and consequently at so

cheap a rate, they have become objects of general ornament as well as of convenience ; and the more expensive ones show the progress of time with an accuracy that would once have been deemed incredible.

WATER. Water was once considered one of the four elements, and in common language, is still frequently so termed. Water, however, is known to be a compound substance, consisting of hydrogen and oxygen. When pure, it is colorless, transparent, inodorous, and insipid. Like all other fluids and substances, it expands by exposure to an increase of temperature ; and with a curious exception, the dilatation, within certain limits, is proportionable to the degree of heat to which it is subjected. When water is heated to a certain point, it acquires the greatest volume it is capable of assuming ; it then boils, and is converted into steam. This point is indeed an arbitrary one, being what is called 212° on the scale of Fahrenheit's thermometer. Steam, at this point, occupies about 1700 times as much space as the water does from which it is generated. It is upon the elastic force of steam communicated by heat, or water thus converted into vapor, and the annihilation of it by cold, that the working of the steam engine depends.

Water is seldom found in a state of entire purity, but, from its great solvent and absorbent power, it is impregnated with a variety of saline substances, either living or undergoing a process of fermentation. The effect of these is to communicate different properties, and generally give it a peculiar taste, and not unfrequently an odor, which, if not cognizable by the blunted senses of man, is so by animals, especially the camel, which can scent water at a great distance in the desert. The specific gravity is often much increased, especially that of sea water and of mineral waters, from the saline ingredients, and of some of the great rivers, from the quantity of mud and other matters which they contain. Rain water is commonly reckoned the purest ; but that is by no means so free from accidental impregnations as is generally supposed. Whatever foreign ingredients exist in the atmosphere of any place, are brought to the ground by the first rain that falls. Rain water, however, from its comparative great purity, has high solvent powers, which fit it well for the part it has to perform in the economy of nature, and also for many operations in the laboratory. In this respect, it is nearly equal to distilled water. The surface water of sandy districts, is the purest that can be obtained naturally.

Who can count the diversified uses that come from water ? The Christian philosopher never beholds a limpid current of it, or a gurgling rill, without an emotion of pleasure and of gratitude to the Author of it. Let us remember that every drop of rain, which we see fall, bears into the bosom of the earth a quality of beautiful fertility ; remember that each glorious tree, and herb, and shrub, and flower, owes to those drops its life, its freshness, and its beauty ; remember that half the loveliness of the green world is all their gift ; and that without

them we should wander through a dull desert, as dusty as the grave. Take but a single drop of rain, cloistered in the green fold of a blade of grass, and pour upon it one ray of the morning sun, where will you get a lapidary, with his utmost skill, to cut a diamond that shall shine like that? Oh, no! blessed forever be the beautiful drops of the sky, the refreshing soothers of the seared earth, the nourishers of the flowers, that calm race of beings which are all loveliness and tranquility, without passion, or pain, or desire, or disappointment; whose life is beauty, and whose breath is perfume.

WATER CHESTNUT. An aquatic plant of China. The Chinese cultivate even the bottom of their waters, and the beds of their lakes, ponds, and rivulets, produce crops that to us are unknown. Their industry has found out resources in a number of aquatic plants, among which the pitsi, or water chestnut, is one of the greatest delicacies of a Chinese table. The government has caused this plant to be cultivated in all the lakes, marshes, and waste grounds, covered with water, which belong to the state. And the emperor has ordered all the lands which ornament his gardens, to be planted with it, and the greater part of the ditches round his palace are full of it; the flowers and verdure of this plant cover those two vast sheets of water in the centre of Pekin, which are adjacent to the gardens of the imperial palace.

WATER FOWLS. A class of fowls which are surprisingly conformable in the structure of their bodies, to their destination and manner of life. It must be obvious to every observer, that Providence has given these a different formation from that of the land fowls; as their legs and feet are formed for the purposes of wading in water, or swimming on its surface. In those that wade, the legs are usually long and naked; in those that swim, the toes are webbed together, as we see in the feet of a goose, which serve, like oars, to drive them forward with great velocity.

WATERING GARDENS. Opinions are divided on the best time to water gardens, whether morning or evening. A writer observes: Water, when exposed to the sun and air, during the day, will be better applied after four o'clock in the afternoon than at any other time, for then the heat of the sun's rays is decreasing, and the temperature of the soil may be a little modified also; nor do I think there is any great difference betwixt the morning and evening temperature of the soil in the summer months, whilst that of the water must be decidedly great, as is obvious from its having been nine or ten hours without the influence of the sun's rays. I think, therefore, that reason and science justify the practice of evening watering; the oxygen the plants absorb during the night, being restored to the atmosphere during next day; therefore water, if applied in the evening, whether to the roots or leaves, or surrounding surface, will increase the quantity of oxygen to be re-absorbed during the night, and again liberated with

the return of light. But another writer affirms: Evening watering cools the surface excessively, and chills the roots of plants. I prefer the early part of the morning for watering all plants out of doors, and about noon, to water those in the house. Thus leaving to fair experiment the settlement of the question; all agreeing in the fact, that if you begin the practice of watering you must continue it, for the fibrous roots, no longer depending upon themselves for a supply, and diving into the subsoil for it, turn upwards, expecting to receive it from above, and immediately suffer for the want of it, if it be not constantly furnished by surface-watering.

WAX. The bees carry the farina, or pollen, on their hinder legs, but, according to Reamur, this dust does not contain any real wax; nor is this latter substance produced by the mixture of the farina with a glutinous liquor, by trituration, or by any other mechanical process. After long and attentive observation, this naturalist found, that bees actually eat the pollen they collect, and that this pollen is converted, by an animal process, into wax. Virgin wax, or propolis, is a resin of a red color, which the bees collect from different trees, as poplars, birches, and willows. This the insects use to fill up chinks or deficiencies in their habitation, and to encase the dead bodies of large insects, as shellless snails, which have intruded upon their hives; to the end that, by excluding the air, they may be preserved from becoming offensive. Propolis is of a reddish color. It is the most tenacious kind of wax, and is recommended medicinally, as beneficial to the nerves. The pollen gathered by the bees is of various colors; but the combs they construct are always of the same. Every comb, especially when it is newly made, is of a pure white color. This is liable to be injured by age, the operation of the air, and by other accidents. To bleach wax, therefore, it is only necessary to extract the foreign bodies that have insinuated themselves into its substance, and obscured its original color. Hence the distinction, in commerce, between white and yellow wax; the first being bleached and the second only melted. With a view to bleach wax, it is cut in small pieces, melted, and poured into cold water, where it granulates. In this state, it is exposed to the sun and air; melted and granulated repeatedly; then submitted to the influence of the sun, air, and dew, in the interval between each liquefaction. When the wax is perfectly blanched, it is dissolved for the last time, and cast into flat moulds, in which it is again exposed to the air, for one or two days, in order to render it more transparent.

WAX TREE. A beautiful evergreen shrub, growing in wet sandy ground, about the edges of swamps, in the Floridas. It rises erect nine or ten feet, dividing itself into a multitude of nearly erect branches, which are adorned with many green leaves. The branches produce abundance of large round berries, nearly the size of bird cherries, which are covered with a coat of white wax. It is in high

estimation with the inhabitants for the production of wax candles, for which purpose it answers equally well with beeswax, or preferable, as it is harder, and more lasting in burning.

WEASEL. This animal, though little seen in the environs of towns, is an animal very well known in most parts of the country ; it varies in no great degree from the stoat, either in shape, make, or propensity. Its favorite alimentary enjoyment seems to be the destruction of eggs by suction ; although it pursues and destroys poultry and game with equal avidity. By some instinctive impulse of scent or sagacity, the weasel is enabled to follow a hare, which it pursues with great enthusiasm ; and whenever the hare unsuspectingly squats, if this inveterate enemy happen to get up, it immediately makes a spring, seizes the hare near the poll, and never quits its hold till the animal (running in a state of distraction, and with the most piteous shrieks) at length dies. The weasel may justly rank in the list of venomous animals, for its bite is, among quadrupeds, almost universally fatal ; a hare or rabbit bitten by the weasel is seldom known to recover.

In its pursuits, it has several points in its favor ; its activity and the peculiar formation of its claws, enable it to scale walls with so much ease, that no spot is secure from its depredations. For its luxurious repasts, however, upon eggs and young poultry, it makes some amends to the farmer by its inveteracy to rats and mice ; having something of the ferret in its nature, it is to these an implacable enemy, and pursues them with mortal hatred. Of young pigeons it is likewise a destructive depredator ; and when it has young is more bold and indefatigable in its researches. In the dusk of the evening and by moonlight, it may frequently be seen stealing from its lurking place, near the farm house, taking the barns, stables, pigsties, and poultry house in search of prey ; which, when it has killed, if not too large, it drags to its place of retreat. In the summer it will venture farther from its haunts, and may be often traced by the side of rivulets and near mills, in both places in quest of rats.

WEATHER. Weather denotes the state of the atmosphere, with regard to heat and cold, wind, rain, and other meteors. The phenomena of the weather must have at all times attracted much of the attention of mankind ; because their subsistence and their comfort, in a great measure, depended upon them. It was not till the seventeenth century, however, that any considerable progress was made in investigating the laws of meteorology. How desirous soever the ancients might have been, to acquire an accurate knowledge of this science, their want of proper instruments entirely precluded them from cultivating it. By the discovery of the barometer and thermometer, in the last century, and the invention of accurate electrometers and hygrometers, in the present, this defect is now pretty well supplied ; and philosophers are enabled to make meteorological observations with

ease and accuracy. Accordingly, a very great number of such observations have been collected, which have been arranged and examined, from time to time, by ingenious men, and consequences deduced from them, on which several different theories of the weather have been built. But meteorology is a science so exceedingly difficult, that, notwithstanding the united exertions of some of the first philosophers of the age, the phenomena of the weather are still very far from being completely understood; nor can we expect to see the veil removed, till accurate tables of observations have been obtained from every part of the world, till the atmosphere has been more completely analysed, and the chemical changes which take place in it ascertained.

WEEDS. Every plant which grows in a field or garden other than that of which the seed has been sown by the husbandman or gardener is called a weed, and, inasmuch as it interferes with the intended crop, should be carefully eradicated. It is a proof of good cultivation when few weeds appear among the growing crops, and many of the operations of tillage are intended chiefly for their destruction. The seeds of annual weeds are chiefly brought on the land in the manure which is made in the yards, where the cattle, fed on hay or straw, swallow the seeds, which pass through them undigested. By exciting a greater degree of fermentation in the mixture of dung and litter some of the seeds may be destroyed, but many of them will keep their vegetative powers even after having been exposed to a considerable heat; and as it is not advisable to let the manure undergo a great degree of decomposition before it is carried to the land, many weeds always escape destruction, and vegetate as soon as they are placed in a favorable situation. Those which are buried deep lie dormant for a long time, and vegetate as soon as the plough or spade brings them up again.

One of the greatest advantages of composts made with human excrements mixed with earths and mineral substances is, that they introduce no weeds into the soil. It is reported that in China, where the dung of cattle is little used, in comparison with human excrements, no weeds are to be found in the fields; and if more attention were paid to the preservation of this highly enriching manure, and its proper application to the soil, much expense would be saved which is now unavoidably incurred in the destruction of weeds. Nor is it to be forgotten that whatever of weeds are left to grow exhausts so much of the fertilizing properties of the soil needed in producing the crops. By caution and a little labor weeds will generally be kept down.

WEEK. A division of time consisting of seven days. As this division of time had its origin from the positive command of God; so it has been known and observed by those only who have been acquainted with divine revelation. Besides the incalculable moral and religious advantages resulting from a dedication of the seventh part of

time as a Sabbatical rest, it is of no small importance that this wise and benevolent institution has mitigated the rigor and eased the burden of slavery. The slaves of the ancient pagan nations, for instance, the Egyptians, Greeks and Romans, had no sabbath, no seventh day of rest. "The whole week, the whole year, was, in general, with but few exceptions, one uninterrupted round of labor and oppression." But, among the Israelites of old, and among Christian nations since, the divine prohibition of labor on the sabbath, a prohibition that mercifully names in particular the man servant, and the maid servant, has brought no inconsiderable relief, even in a temporal point of view, to this wretched class of people. The French government, in 1685, enacted laws which obliged every planter in their West India islands, to have his negroes properly instructed in the doctrines and duties of Christianity; and allowed the slaves for these purposes, and for days of rest, not only every Sunday, but every festival usually observed by the Romish Church. And it is said that a similar regulation was made by the Spanish government, a long time ago; and that obedience has been paid to it, particularly in the Havana. It had been well if Protestant nations had always treated their slaves in a manner correspondent with these examples.

WEST HIGHLAND CATTLE. The cattle which are natives, or descendants of natives, of the western coast of Scotland, or the islands adjacent thereto, are called West Highlanders. The particular value of them consists in their being hardy, and easily fed; in that they will live, and sometimes thrive, on the coarsest pastures; that they will frequently gain from a fourth to a third of their original weight in six months of good feeding; that the proportion of offal is not greater than in the most improved larger breeds; that they will lay on their flesh and fat equally on the best parts; and that, when fat, the beef is close and fine in the grain, highly flavored, and so well mixed or marbled, that it commands a superior price in every market. Their common color is black, or pale red, the head small, the ears thin, the muzzle fine, and rather turned up.

Forty years ago, the treatment of cattle was, with very few exceptions, absurd and ruinous, to a strange degree, through the whole of the Hebrides. With the exception of the milch cows, but not even of the calves, they were all wintered in the field; and, if they were sometimes scantily fed with hay, it was coarse, and withered, and half rotten; or if they got a little straw, they were thought to be well taken care of. The majority got little more than sea-weed, heather, and rushes. One-fifth of the cattle, on an average, used to perish every winter from starvation. When the cold had been unusually severe, and the snow had lain long on the ground, one-half of the stock has been lost, and the remainder have afterward been thinned by the diseases which poverty had engendered. It proved the excellency of the breed, that, in the course of two or three months,

so many of them got again into good store condition, and might almost be said to be half fat in that time. In fact there are numerous instances of these cattle, which had been reduced to the most dreadful state of impoverishment becoming fattened for the butcher in a few months after being placed in a rich pasture.

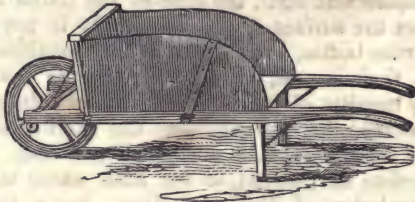


WEST HIGHLAND BULL.

WHEAT. This grain is now cultivated in almost all temperate climates, throughout the greater part of Europe, in all the provinces of China, in Natolia, Syria, Persia, and other temperate parts of Asia, in the north of Africa, and at the Cape of Good Hope, in the United States, and even in the extreme southern parts of South America. The culture of wheat, from time immemorial, and in different soils and climate, has produced numerous varieties, which in some instances have even been mistaken for distinct species. Among these varieties the most obvious are hard or flint wheats, the soft wheats, and the Polish wheats. The hard wheats are the produce of warm climates, such as Italy, Sicily, and Barbary. The soft wheats grow in the northern parts of Europe. The Polish wheats grow mostly in the country from which they derive their name, and are also hard wheats. It has been estimated that the quantity raised in the United States is in the neighborhood of one hundred millions of bushels annually, which converted into flour will make about twenty millions of barrels. Were it all used at home, it would be about four bushels to each individual, man, woman, and child, which converted into bread would be about a pound a day to each individual.

There is in the country an abundance of land adapted to the growth of wheat not yet used, so that should there be a foreign demand for it, this valuable grain could be produced to any amount however great.

WHEELBARROW. This is a well known implement, less common than it should be on farms, to be used by Land for carrying light loads a short distance. No farmer especially should be without one. To remove earths, lime, manure, wood, farm or garden products, or indeed any thing else, only a few rods, it is quicker and more economical than to use a cart or waggon. The greater the diameter of the wheel of a barrow, and the smaller the axles, or ends of the gudgeons, on which it turns, the less power will be required to drive it forward; for the leverage is thereby augmented, and the friction materially reduced. It is supposed that the diameter of the wheel might advantageously be increased one-half above what it generally is. With a barrow thus constructed a man will move eight hundred pounds with the same ease, that with the usual barrow he moves five hundred pounds. Barrows are frequently employed in England, constructed entirely of wrought iron, weighing less than an hundred pounds, which of course are very durable and easily moved.



WHEELBARROW.

WHEELS. The utility of wheels to carriages may be said to be two-fold; namely, by diminishing or more easily overcoming the resistance or friction from the carriage, and more easily overcoming obstacles in the road. In the first the friction on the ground is transferred in some degree from the outer surface of the wheel to its nave and axle, and in the latter they serve easily to raise the carriage over obstacles and asperities met with on the roads. In both these cases the height of the wheel is of material consideration; as the spokes act as levers, the top of an obstacle being the fulcrum, their length enables the carriage more easily to surmount them, and the greater the proportion of the wheel to the axle serves more easily to overcome the friction of an axle. The principle, therefore, of mechanical philosophy is, that large wheels are best adapted for surmounting inequalities on the road. Nevertheless there are other circumstances of a counteracting tendency, so that limits should be prescribed for the height

of wheels. If the radius exceeds the height of that part of the horse to which the traces are attached, the line of traction will be inclined to the horizon, and part of the power will be exerted in pressing the wheel to the ground. Besides, the circumference of the wheel might be imagined of such extent as almost to resemble, in its contact with the ground, a flat surface; in which case, the effect would approximate the dragging one flat surface upon another one. The best average size of wheels is in the range of six feet in diameter.

WIGAN WELL. About a mile from Wigan, in Lancashire, England, is a spring, the water of which burns like oil. On applying a lighted candle to the surface, a large flame is suddenly produced, and burns vigorously. A dishful of water having been taken up at the part whence the flame issues, and a lighted candle held to it, the flame goes out; notwithstanding which the water in this part boils and rises up like water in a pot on the fire, but does not feel warm on introducing the hand. What is still more extraordinary, on making a dam, and preventing the flowing of fresh water to the ignited part, that which was already there having been drained away, a burning candle being applied to the surface of the dry earth, at the same point where the water before burned, the fumes take fire, and burn with a resplendent light, the cone of the flame ascending a foot and a half from the surface of the earth. It is not discolored, like that of sulphurous bodies, neither has it any manifest smell, nor do the fumes, in their ascent, betray any sensible heat. The latter unquestionably consists of inflammable air, or hydrogen gas; and it ought to be observed that the whole of the country about Wigan for the compass of several miles, is underlaid with coal. This phenomenon may therefore be referred to the same cause which occasioned the dreadful explosion of Felling Colliery; but in the present case, this destructive gas, instead of being pent up in the bowels of the earth, accompanies the water in its passage to the surface.

WILD BOAR. A ferocious and formidable animal of the forest. He is always found of an iron gray, inclining to black; his snout is much longer than that of the tame hog; his tusks also are larger, some of them being seen almost a foot long. When he is come to a state of maturity, he walks the forest fearless, dreading no single creature. He does not seek the lion to attack, but will not fly at his approach. We are told of a combat of a lion and a wild boar, in a meadow near Algiers, which continued for a long time with surprising obstinacy. At last, both were seen to fall by the wounds they had given each other; and the ground all about them was covered with their blood. When this creature aims at the hunter nothing will avail but courage and agility; if the hunter flies for it, he is surely overtaken and killed. If the boar comes straight up, he is to be received at the point of the spear; but if he makes doubles and windings, he is to be watched very cautiously, for he will attempt

to get hold of the spear in his mouth ; and if he does so, nothing can save the huntsman but another person attacking him behind.



WILD BOAR.

WILD CAT. The common wild cat of North America stands very high on its legs, and has a short tail which is curved upwards at its extremity ; which circumstances tend to give the animal an appearance of being somewhat disproportioned. In other respects its physiognomy reminds one strongly of the domestic cat, to which its general aspect and movements are very similar. The residence of the wild cat is usually in woody districts, where it preys upon birds, squirrels, and other small animals belonging to the cat genus. This animal is about two feet long, and twelve or thirteen inches in circumference. The tail but little exceeds three inches in length. The general color is a deep reddish, mingled with small spots of blackish brown. The animal is now very rarely met with in New England ; but is more common in Canada and the Western States. It must be distinguished from the wild cats occasionally shot in our woods, which have sprung from the domestic cat.

• **WILD GOOSE.** A bird of passage. From the beginning of April to the middle of November, this fowl resides chiefly in the northern and north-easterly parts of America. In those parts they produce their young, and are to be found in the rivers and harbors, in immense numbers. In November they come in large flocks from the north and northeast, and pass off to the southwest. In March and

April, they return from the southwest, in a contrary direction, and go back to their summer habitation. These flocks frequently consist of fifty or sixty; they fly at a great height, and appear to observe great regularity in their passage. They sometimes follow one another in a straight line, but are more generally drawn up in the form of a wedge, and appear to be led by one of the strongest and most active; and while they keep together they seem to understand their course perfectly well.



WILD GOOSE.

WILD HORSE. In the boundless plains of Tartary and Arabia, wild horses are often seen feeding in droves of five or six hundred. Whenever they sleep in the forests they have always one among their number that stands as sentinel to give notice of any approaching danger; and this office they take by turns. If a man approaches them while they are feeding by day, their sentinel walks up boldly near him, as if to examine his strength, or to intimidate him from proceeding; but, if the man approaches within pistol shot, the sentinel then thinks it high time to alarm his followers; this he does by a loud kind of snorting; upon which they all take the signal, and fly off with the speed of the wind; their faithful sentinel bringing up the rear. As they go together, they will not admit any strange animals among them, though even of their own kind. Whenever they find a tame horse attempting to associate with them, they instantly gather round him, and soon oblige him to seek safety by flight.

WILD PINE. A native plant of Jamaica, which is so contrived by the Author of Nature, as to be of the utmost use to the inhabitants of that hot climate, where there is frequently a scarcity of water. The wild pine is a plant so called, because it somewhat resembles the bush that bears the pine apple. They are commonly supported or grow from some lanch, knot, or excrescence of a tree, where they

take root and grow upright. The root is short and thick, whence the leaves rise up in folds, one within another, spreading off to the top. They are of a good thick substance, ten or twelve inches long. The outside leaves are so compact, as to contain the rain water as it falls; they will contain a pint and a half, and sometimes a quart. The thirsty traveller sticks his knife into the leaves, just above the root; and this lets out the water which he catches in his hat.

WINDOW. In the most ancient eras, the windows of habitations were very small and narrow; and the same remark is true of the castle and other edifices which were constructed during the middle ages. In the painting on the Greek vase which represents Jupiter about to scale the window of Alcmena, the opening is exceedingly small. According to Seneca, those of the baths of Scipio were so small that they merited not the name, and might rather be denominated crevices. As the Romans improved, however, in the elegant arts, this particular was not overlooked; and both their town and country houses were decorated with numerous and ample windows. It was not customary to have them overlooking the street; and they were, in the majority of instances, confined to the interior court of the house. The ancient temples had not, generally, windows; some exceptions, however, exist to this observation. Before the use of glass became common, which was not till towards the end of the twelfth century, the windows in England seem generally to have been composed of paper, which, properly prepared with oil, forms no contemptible defence against the intrusions of the weather, and is a tolerable medium for the admission of light. In warm climates, as in the West Indies, windows are often quite open, without glass or any translucent medium to admit light while it excludes air. In Russia, salt is used to clean windows from frost, on account of its effects in liquefying this substance. It is rubbed on the glass with a sponge. In England windows are one of the articles subjected to taxation.

WINE. The fermented juice of the ripe fruit of the *Vitis vinifera* of Linnæus. There is a great variety in wines; but they have been principally confined to four sorts, as sufficient for official use, viz. the *vinum album hispanicum*, or mountain wine; the *vinum canarium*, canary or sack wine; the *vinum rhenanum*, or rhenish wine; and the *vinum rubrum*, or port wine. On a chemical investigation, all wines consist chiefly of water, alcohol, a peculiar acid, the carbonic acid, tartar, and an astringent, gummi-resinous matter, in which the color of the red wine resides, and which is expressed from the husks of the grape. They differ from each other in the proportion of these ingredients, and particularly in that of alcohol, which they contain. The qualities of wines depend not only upon the difference of the grapes, as containing more or less of saccharine juice, and the acid matter which accompanies it; but also upon circumstances attending the process of fermentation.

WIRE. A piece of metal drawn through the hole of an iron into a thread of a fineness answerable to the hole it passes through. Gold wire is made of cylindrical ingots of silver, covered over with a skin of gold, and thus drawn successively through a vast number of holes, each smaller and smaller, till at last it is brought to a fineness exceeding that of a hair. A cylinder of forty-eight ounces of silver, covered with a coat of gold, only weighing one ounce, as Dr. Hally informs us, is usually drawn into a wire, two yards of which weigh no more than one grain; accordingly ninety-eight yards of the wire weigh no more than forty-nine grains, and one single grain of gold covers the ninety-eight yards; so that the ten-thousandth part of a grain is above one-eighth of an inch long.

WOLF. The wolf is, by some naturalists, considered the original stock of the domestic dog, and, indeed, it very much resembles a large dog in its general appearance. The European wolf leads a solitary life, but, when urged by hunger, unites in packs, which, at times, even become dangerous to travellers. It possesses such strength that it is able to carry off a sheep at full speed, and few dogs are able to attack it with success. When taken young, it is easily tamed, and becomes attached to its keeper, recognising him even after a year's absence. The female brings forth her young in a retired place in the forest, and defends them courageously. The American wolf is probably a distinct species; but this point is not yet perfectly ascertained. It was formerly numerous in all parts of the United States, but is now almost extinct in the more settled districts. We have also another species of the wolf—the prairie, or the barking wolf—on the unwooded plains of the Missouri. The black wolves are supposed to be mere varieties of the common species.

WOODCHUCK. This animal is common in all the temperate parts of America. It is also called the Maryland Marmot, being numerous in that state. It does great injury to the farmers, as the quantity of herbage it consumes is really surprising. It burrows in the ground, on the side of hills, and these galleries extend to great distances under ground, and terminate in various chambers. Here the woodchuck makes himself a comfortable bed of dry leaves, grass, and any soft rubbish, where he sleeps from the close of day till the next morning is far advanced. It is fond of cabbage, lettuce, and other garden vegetables. When in captivity, it is exceedingly fond of milk and bread. At the commencement of cold weather, it goes into winter quarters, blocks up the door within, and remains torpid till the warm season. It is about the size of a rabbit, and of a dark brown color.

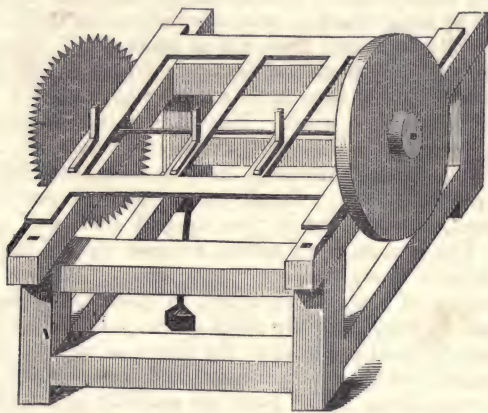
WOODCOCK. The woodcock of the old continent, is about as large as a pigeon, with a bill three inches long. The crown of the head and back of the neck, are barred with black, and a black streak runs from the bill to the eyes. The American woodcock greatly re-

sembles that of Europe, but is considerably less, and very differently marked. This bird is universally known to our sportsmen. During the day, they keep the woods and thickets, and at the approach of evening, seek the springs and open watery places to feed in. They soon disperse themselves over the country to breed. In the hot weather, they descend to the marshy shores of our rivers, their favorite springs and watery recesses inland being chiefly dried up. To the former of these retreats, they are pursued by the merciless sportsmen, and shot down in great numbers. The woodcock is properly a nocturnal bird, feeding chiefly at night, and seldom stirring about till after sunset. Their food consists of larvæ and other aquatic worms, for which, during the evening, they are almost continually turning over the leaves with their bill, or searching in the bogs. Their flesh is delicious and prized highly.

WOODS. Even at a comparatively early stage of the arts, mankind appears to have made use of the bright or variegated colors of wood, to give beauty both to their dwellings and their furniture. The temple built by king Solomon, was overlaid on the inside with boards of cedar—"All was cedar; there was no stone seen." Among the most ancient specimens of ornamental furniture that are to be met with, we find that attempts have been made to heighten the effect by the contrast of various kinds of wood. Though both in the materials and in the designs, these are inferior productions of modern art, many of the cabinets which are still preserved, have much higher claims to notice than their mere antiquity. In all these works, a veneer, or thin plate of fancy wood, is laid down in glue upon a surface of a plainer description. The process is, of course, cheaper than if the whole were made of the solid fancy wood.

The beauty of fancy wood arises, in many sorts, from its being cross-grained, or presenting the fibres endways or obliquely to the surface. These different positions of the fibres, as well as their different colors in grained woods, give a clouded and mottled variety to the surface; and, when some of the parts are partially transparent, as in the case of fine mahogany, the surface gives out a play of different tints, as the observer changes his place, or the light falls upon them, and, consequently, is reflected at different angles. When mahogany was first introduced, as a cabinet timber, it seems to have been in the dark-colored, hard, and straight-grained trees, which are now used for chairs and other articles, in which the solid timber is preferred; and, on that account, mahogany was not much used in combination with other woods. When, however, its great value was known, the ease with which it can be cut, the improvement that varnish gives to its colors, the firmness with which it holds in glue, and the improvement which, when properly taken care of, it gains in time, it was found that good mahogany was much too valuable a timber for being used solid, and it began to be employed as the staple timber in veneering.

Mahogany is now of universal use for furniture, from the common tables of a village inn, to the splendid cabinets of a regal palace. But the general adoption of this wood, renders a nice selection necessary for those articles which are costly and fashionable. The extensive manufacture of piano-fortes has much increased the demand for this wood. Spanish mahogany is decidedly the most beautiful ; but occasionally, yet not very often, the Honduras wood is of singular brilliancy ; and it is then eagerly sought for, to be employed in the most expensive cabinet work. A few years since, three logs of this wood, taken from the same tree, were sold to some piano forte manufacturers for fifteen thousand dollars. Next to mahogany, rose wood is most admired for furniture. Some, indeed, give it the preference, probably, however, from the fact that it is less common. The first used for this purpose, is said to have been brought from Cyprus, although the principal supply is now, it is believed, from Brazil.



WOOD-SAWING MACHINE.

WOOD-SAWING MACHINE. Among the important labor-saving purposes of the horse-power machine for farmers, is its application to the sawing of wood and timber. The labor of chopping wood with an axe, and cutting it with a common hand wood saw, where fuel is used very freely, as in some sections of our country, is a most laborious occupation. Those only who have had experience in this toil, can judge of its odious severity. Fifty odd years have not blotted it from our own recollection. It used to occupy one man most of the time for six months, to supply the family fires. The cut connected with this paragraph, represents the machine to be attached to the horse power for sawing wood. It is easily driven by a one horse

chain power, and is capable of sawing several cords in a day. It is simple and easily worked and kept in order. Others, of larger dimensions, are used for slitting plank and boards. For this purpose, a different saw is required than when used for cutting across the grain. For the last purpose, the teeth are triangular; for the former, they are hooked like an eagle's beak. The first is called the cross-cut, the last the rip-saw. The above machine, and every thing else wanted by farmers, can be had of A. B. Allen & Co., New York, who have a manufactory for agricultural implements equal to any one in the country.

WOOL. This is the soft, hairy, or downy substance which forms the covering of sheep, and is found in smaller proportion on many other animals. It is an article which has continued from the earliest period down to the present day to be of primary importance, having always formed the principal part of the clothing of mankind in most temperate regions. Authors have seemed to imagine that the production of wool was confined to the sheep; practical men, however, know that there is a numerous list of animals, on whom, at some seasons of the year at least, wool is to be found. The fineness of the wool differs greatly on different parts of the sheep. That running down the side of the neck, and covering the shoulders, the ribs, and the back is the finest; the next covers the superior part of the legs and the thighs, and extends up to nearly the haunch and tail, and a still inferior portion runs along the upper part of the neck, the throat, the breast, the belly, and the lower parts of the legs.

There is also a considerable variation in this respect in different breeds, and in different individuals of the same breed; and although a fleece, taken generally, may be said to be adapted to a particular use, yet a portion of it may be employed in the manufacture of a much more valuable article; and at the same time, a greater quantity will be thrown aside as not sufficiently fine for the originally intended purpose. The influence of temperature on the growth of wool is very considerable. Sheep, in a hot climate, will yield a comparatively coarse wool, and those in a cold climate will carry a finer, but, at the same time, a closer and warmer fleece. The natural instinct of sheep would seem to teach the wool-grower the advantage of attending to the influence of temperature on him. He is evidently impatient of heat. In the open district, and where no shelter is near, he climbs to the highest part of his walk, that if the rays of the sun must fall on him, he may nevertheless be cooled by the breeze; but, if shelter is near, of whatever kind, every shaded spot is crowded with sheep. And pasture has a very great influence on the fineness of the fleece. The staple of the wool, like every other part of the sheep, must increase in length or in bulk, when the animal has a superabundance of nutriment; and on the other hand, the secretion which forms the

wool must decrease, like every other, when sufficient nourishment is not afforded.

Connected with fineness and trueness of staple, as equal growth as possible over the animal; a freedom from the shaggy portions, here and there, which are occasionally observed on poor and neglected sheep. These portions are always coarse and comparatively worthless, and they indicate an irregular and unhealthy action of the secretion of the wool, which will probably weaken or render the fibre diseased in other parts. Soundness and elasticity are also very important properties in wool. If the pile is sound, there are few qualities in wool of so much consequence as softness. Fashion has done much in effecting this. Softness of the pile is evidently connected with the presence and quantity of yolk or animal oil, more or less abounding in good wool. There is no doubt that this substance is designed not only to nourish the hair, but to give it richness and pliability. Bad management, neglect, exposure, starvation, impair the pliability of the woolly fibre, but chiefly so because they arrest the secretion of the yolk, or change its properties. The color of the fleece is of minor, and yet of no trifling importance. The alteration of the color was the first recorded improvement of the sheep; and its purity, its perfect whiteness, should never be lost sight of by the sheep-master of the present day. To a certain extent, the fleece is frequently stained with the color of the soil on which the animal grows. It is stated on good authority, that in some parts of Gloucestershire, England, the wool acquires an orange color; in Hertfordshire and Warwickshire it is of a brownish red; and in the fens of Lincoln and Cambridge it has a dark-blue tint.

WORSTED. This is a thread that has been spun of wool that has been combed, and which, in spinning, is twisted harder than ordinarily. The wool used for worsted should be of the finest and the longest texture. The thread then has an increased smoothness and strength. This accounts for the superiority of worsted fabrics. The thread thus produced is chiefly used either to be knit or woven into stockings, caps, or gloves, and more recently into various under garments. Worsted has obtained its name from Worstead, a market town in the county of Norfolk, England, where the manufacture of the article was first introduced. The manufactures, which derived their name from the place, are now mostly located in Norwich and vicinity.

WREN. This is a well known genus of birds, closely allied to the warblers, distinguished by their small size, slender beak, short roundish wings, mottled plumage, and the habit of holding the tail elevated. The European wren is, with one exception, the smallest bird on that continent. It is fond of prying about crevices and holes in walls and ruined old buildings, and is constantly in motion, searching for insects, which form its accustomed food. It nestles in similar

situations, or even under the eaves of houses. The winter wren, which visits us in the winter season, and sometimes remains till spring, is considered identical with the European species. Our house wren is distinguished by its longer tail. It is one of our most familiar birds, from Canada to the Gulf of Mexico, taking up its abode in the vicinity of dwellings; and its note is well known even in the midst of our most populous cities. The habits of all the wrens are more or less similar.

YAM. This a slender herbaceous vine, having large tuberous roots, which are much used for food in Africa and the East and West Indies. They are mealy and esteemed to be easy of digestion, are palatable, and not inferior to any roots now in use, either for delicacy of flavor or nutriment. They are eaten either roasted or boiled, and the flour is also made into bread and puddings. The juice of the roots, when fresh, is acrid, and excites an itching on the skin. There are many varieties of the roots; some spreading out like the fingers; others twisted like a serpent; others, again, very small, scarcely weighing more than a pound, with a whitish, ash-colored bark, whereas the bark is usually black. The flesh of the yam is white or purplish, and viscid, but becomes ferinaceous or mealy when cooked. One variety of the yam sometimes has roots three feet in length, and weighing thirty pounds. All the varieties are propagated like the potato.

YEAST. Yeast, or barm, as it is sometimes called, is the froth of beer and other malt liquors when in a state of fermentation. When thrown up by a quantity of malt or vinous liquid, it may be preserved to be put into another at a future period, on which it will exert a similar fermentative action. Yeast is used in making bread, which, without such action, would be heavy and unwholesome. Yeast for bread making is also prepared in families in the following manner. Boil twelve clean-washed potatoes; and at the same time boil, in another vessel, a handful of hops in a quart of water; peel and mash the potatoes fine; pour part of the hop water, while hot, upon the potatoes, and mix them well; then add the remainder of the hop water and a spoonful of sugar; beat all well; add a small portion of leaven to bring on fermentation, and set it in a cool place. One cupful of the potato yeast will answer for two quarts of flour.

YEW. This is an evergreen tree, belonging to the family of the pines, and which is common in many parts of the north of Europe. The foliage somewhat resembles that of the hemlock-spruce, except that the leaves are larger. The fruit, however, is not a cone, but a small red berry, in the hollow part of the extremity of which the green seed appears. The yew was formerly extensively cultivated in Great Britain, and, on account of its gloomy and funereal aspect, was usually planted in church-yards. The wood, which is peculiarly hard, smooth and tough, was manufactured into bows; but since the introduction of fire arms, the tree is no longer planted except for orna-

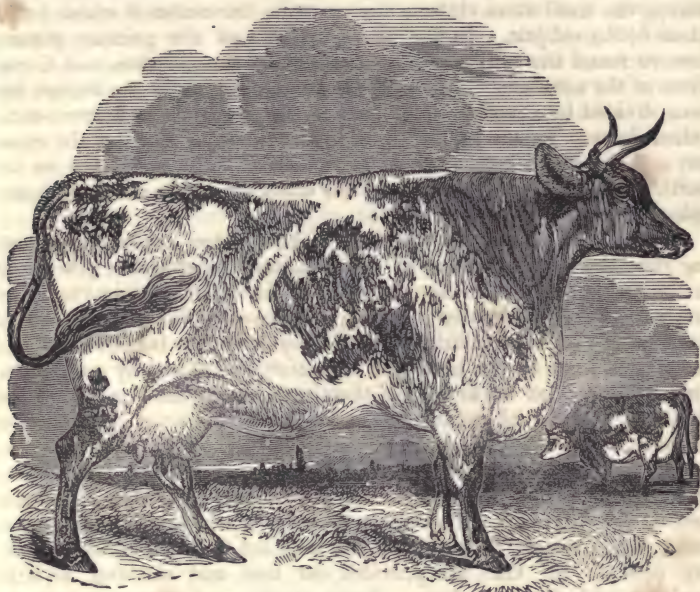
ment. In the formal style of gardening which was once prevalent, few trees were more the subject of admiration, from its bearing to be clipped, without injury, into almost any form. The veins of the wood are strongly marked, and are susceptible of a very high polish ; hence it is valuable for veneering and other cabinet work, and is in frequent use. The wood is also good for the cogs of wheels, and any situations where exposed to moisture, as it resists decay from meteorological exposure.

YORKSHIRE CATTLE. We give a few sketches of the Yorkshire cattle from the elaborate description of them in Stevens' edition of Youatt and Martin, to which the reader is referred for a vast fund of valuable information to the stock amateur. Years ago the Yorkshire cow was, compared with other breeds, as great a favorite in the London market as at present. She yielded more milk, in proportion to the quantity of food consumed, than could be obtained from any other breed ; but, when the dairyman had had her four or five years, she began to fall off, and he dried and sold her. By degrees, however, the more intelligent of the breeders began to find that, by cautiously adopting the principle of selection, by finding a short-horned bull whose progeny were generally milkers, and crossing some of the old Yorkshires with him ; but still regarding the milking properties of the dam, and the usual tendency to possess these qualities in the offspring of the sire, they could at length obtain a breed that had much of the grazing properties of the short-horns in the new breed, and retained, almost undiminished, the excellences of the old breed for the pail.

The quantity of milk given by some of these cows is very great. It is by no means uncommon for them, in the beginning of the season, to yield thirty quarts a day ; there are rare instances of their having given thirty-six quarts ; but the average may be estimated at twenty-two or twenty-four quarts. It has been said that this milk does not contain the same proportionate quantity of butter. That their milk does not contain the same proportionate quantity of butter as that from the long-horns, the Scotch cattle, or the Devons, is probably true ; but there is reason to believe that the difference has been exaggerated, and is more than compensated by the additional quantity of milk.

In speaking of the milking qualities of these cows, he remarked that the udder is rather large in proportion to the size of the animal, but not too large. It must be sufficiently capacious to contain the proper quantity of milk, but not too bulky, lest it should thicken and become loaded with fat. The skin of the udder should be thin, and free from lumps in every part of it. The teats should be of moderate size ; at an equal distance from each other every way ; and of equal size from the udder to nearly the end, where they should run to a kind of point. When they are too large near the udder, they permit the milk to flow down too freely from the bag, and lodge in them ; and

when they are too broad at the extremity, the orifice is often so large that the cow cannot retain her milk after the bag begins to be full and heavy. The udder should be nearly of the same size, before and behind, or, if there be any difference, it should be broader and fuller before than behind.



YORKSHIRE COW.

ZEBRA. An animal of the horse kind, and a native of the southern parts of Africa. This creature is rather less than a mule, is exceedingly wild, and amazingly swift. Its shape is elegant; its hair fine and smooth; its head, its neck, and its whole body is striped in such a manner as to resemble a garment made of the finest ribands; and it is in all respects one of the most beautiful of animals.

ZINC. A semi-metal of a whitish color, nearly resembling that of lead, though it does not so speedily tarnish. It is of great utility in the arts. Combined with gold, in equal portions, it forms a hard white compound, that admits a fine polish, and may be advantageously manufactured into specula, for optical instruments. Zinc and tin, melted together, produce a kind of pewter; and as the former spreads more uniformly, while it is much harder, and less fusible than tin, it has been proposed as a substitute for the latter, in tinning copper vessels. Zinc and copper readily unite in the fire, forming a metal distinguished by the general name of yellow copper; but which

is divided into several sorts, according to their respective proportions. Thus, three parts of copper and one of zinc, constitute brass; five or six of the former, and one of the latter, afford pinchbeck. Zinc is found in England, Hungary, and some other parts of the globe.

ZODIAC. The zodiac is an imaginary belt round the heavens, among the fixed stars, sixteen degrees wide, the centre of which is the plane of the ecliptic. In this space or belt all the primary planets revolve round the sun, with the exception of Juno, Pallas, and Ceres, three of the asteroids. The ecliptic, and consequently the zodiac, has been divided into twelve equal parts, consisting of thirty degrees each, called signs. As one-half of the ecliptic is situated north of the equator, and the other half south of it, no six of these signs are in the north equatorial hemisphere, and the other six in the southern hemisphere.

ZOOLOGY. Few departments of knowledge are more interesting than the natural history of animals, and the attention given to it in the present age, furnishes the best evidence that its claims to notice begin to be fully estimated. In our own country the inducements to its cultivation are peculiarly strong, for our immense lakes, forests, and mountains have as yet been but imperfectly explored by naturalists, and the little that is known of their productions leads to the belief that they contain abundance to encourage and reward the labors of science. The study of zoology is particularly advantageous to the young, from its direct tendency to cultivate one of the most useful habits of the mind, that of attentive observation of things of common and daily occurrence. Its objects are everywhere around us—swimming in the waters, flying in the air, walking the earth, and burrowing beneath it. One set provides our food and clothing, another purloins and destroys them. Some attack, and others protect us. Their forms are continually before our eyes, and their voices always sounding in our ears.

In order to treat clearly of the animal kingdom, it is necessary to consider it according to some method of arrangement, by which those animals which most resemble one another are connected together for the convenience of description. This arrangement is founded upon their form and structure, and separates them into various divisions and subdivisions, according to their degree of similarity, and the points in which their structures correspond. Such a system of arrangement is called a classification of the animal kingdom; and an accurate acquaintance with the principles on which it is founded will be of great assistance to the student of natural history.

All animals are divided in the first place into two grand divisions, namely, into vertebral, embracing those that have a spine, or vertebres, and into invertebral, comprehending all those that are destitute of a spine, or vertebral column. The vertebral animals are subdivided into four classes, and the invertebral into five. Each of the

classes is divided into a greater or less number of orders, distinguished by some important, clear, and remarkable peculiarities of conformation and structure, which are common to all the animals included under each of them. Orders are subdivided into genera. These comprehend animals that have a general external resemblance to each other, a kind of family likeness. Genera are made up of species. Each distinct kind of animal constitutes a species, and they are known from one another by their size, color, form, and various other circumstances of external appearance. Each kind of animal, then, constitutes a distinct species; a number of species taken together form a genus; those genera which have important and well defined points of resemblance in structure and conformation common to all, are placed together in an order; whilst upon a similar principle, but more extensive in its application, these orders are marshalled into separate classes.



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